SEP 12 1944

FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

Freighters loading wheat at Port Arthur, Ontario

SEPTEMBER 1944

Observations on the Australian Scene

Saving Manpower Through Safety

Will Home Canning Affect Food Sales?

New Way To Prevent Browning of Fruit

How To Rid Plant Of Rodents

Refining Edible Fats and Oils

Fruit Juices Yield Food Yeast

McGRAW-HILL PUBLICATION

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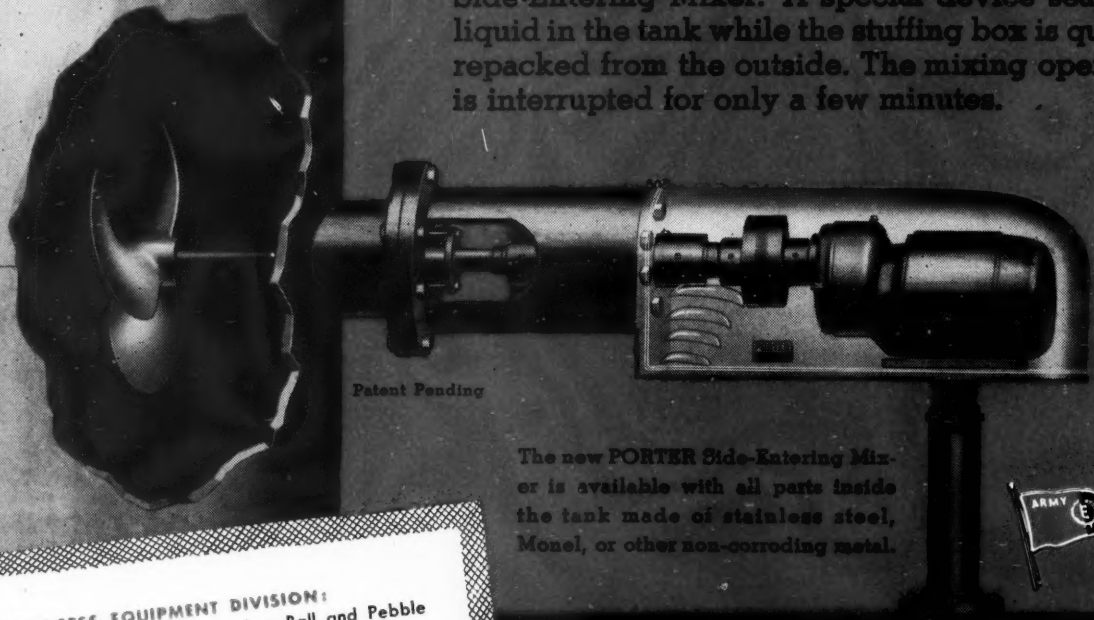

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Vol. 16, No. 9 — SEPTEMBER, 1944

SPECIAL FEATURES
Action Needed on Equipment 61
On the Australian Scene ..... *By L. V. Burton* 63

RESEARCH
Fruit Juices Yield Food Yeast
By J. J. Stubbs, W. M. Noble and J. C. Lewis 68
Research Reveals New Facts for Food Technologists 71
Asparagus Waste Fed to Microbes 87

QUALITY CONTROL
How To Rout Rodents ..... *By Bernard P. Kolkana* 72
No Browning of Cut Fruit When Treated by New Process
By Donald K. Tressler and Clarence DuBois 75

DEHYDRATED FOODS
New Facts About Packaging and Storing Dehydrated Foods —Part VIII
By Members of Research Staff, Continental Can Co. 76
How Weather Affects Dehydrator Operation. *By J. B. Pardiek* 79

MANAGEMENT
Safety Saves Manpower ..... *By E. V. Gill* 80

DISTRIBUTION
Will Home Canning Affect Food Sales? .. *By Gideon Hadary* 83
How Bakery Delivers 20,000 Pies a Day 84
Europe's Food Supply 86

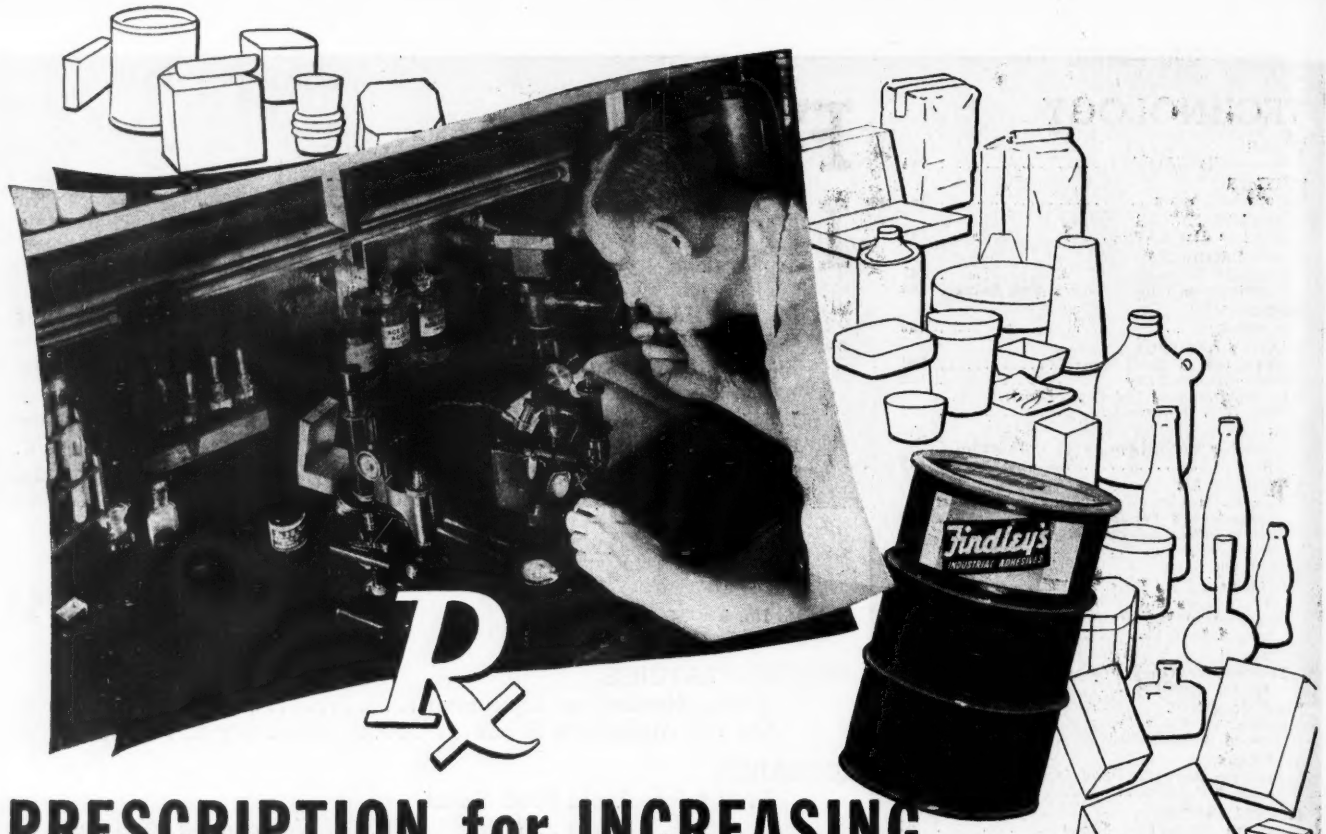
FREEZING
Freezing Provides an Answer to Sweet Potato Problem —Part III ..... *By J. G. Woodroof and Ida S. Atkinson* 88

ENGINEERING
Temperature Control Saves Can Solder
By D. W. Choate and R. R. West 90

PRODUCTION
Refining Edible Fats and Oils—Procedures and Problems
By J. Davidsohn and A. Davidsohn 91

EVERY MONTH

Editorials ..... 61 and 93
Talk of the Industry 62
Automotive 84
New Packages and Products 96
Food Industry News 101
Indicators 106
OPA Price Regulations 108
WPB Orders 109
WFA Orders 109
Capital Views 110
Men, Jobs and Companies 113
Food Equipment News 117
Catalogs and Bulletins 127
Patents 128
Alien Patents 129
Books 130
Questions and Answers 132
Food Technology—Abstracts 141
Formulas 147



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The *Stake* of the United States in Expanding World Trade

WITH the war in Europe racing to a climax, and with a sure pattern for the defeat of Japan already outlined, American business is confronted with the need for an immediate decision on long-term economic policy.

What is this country's foreign trade program to be after the war?

No intelligent appraisal of all the factors any longer can allow us to postpone considering the issue merely because, in the past, foreign trade absorbed barely eight per cent of our production.

Actually, a whole new set of conditions was injected into the picture by the first World War; but we persisted in ignoring these new factors.

Almost overnight, the United States was transformed from the largest debtor nation in the world to the second largest creditor nation. At the same time, we made faster technological progress than any other nation. Thus we created the need for more dollar exchange on the part of the rest of the world and simultaneously made it harder for other nations to earn dollars.

Today, as another, far vaster war is approaching its end, those changed circumstances are magnified. America has new responsibilities—to itself, and to the world.

Our war-inflated industrial capacity cannot be allowed to drop back to prewar levels without causing a domestic crisis which we dare not permit.

And, because so much of the world is geared to the American industrial machine, we can no longer contemplate calmly the repercussions of a largely self-sufficient trade program or of an unplanned foreign trade program. Either would inevitably set the stage for the next world war.

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If we are going to prepare ourselves intelligently to cope with this new problem, we must acknowledge certain basic principles.

World trade cannot be rebuilt simply by attempting to restore *prewar* flows of goods. The war has so completely changed the economic fiber of many countries that it is necessary to develop *new* trade relationships. The East Indies, for example, may find the demand for their rubber considerably reduced; the United States may, to a large extent, have to cease exporting cotton; Japan will need to find new substitutes for much of its exports of silk; the British will need new markets to replace the income which they formerly derived from their large overseas investments.

We cannot expand markets for our goods, at home or abroad, unless we find ways of buying more supplies from more people at home or abroad, so that they will have more dollars to spend.

And we probably cannot create increasing buying power abroad without first exporting more of our technical skills—our engineers, our production and management men—to build new markets for our own specialties.

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What is needed to rebuild the world's economic system?

1. Most basic of all, of course, are stable governments which command popular support. In the absence of strong governments, currency stability cannot be achieved.

2. Most war-stricken countries, for a year or two, will need rehabilitation loans, because they will require far more raw materials, equipment, and live stock than they can pay for out of current production.

3. Loans, however, are only a stop-gap, though often a necessary one. Far more important than rehabilitation loans will be the creation of better opportunities for war-stricken countries to sell to the rest of the world, particularly to the United States, South America, South Africa, and India. The ravages of war do not completely destroy the ability of a country to sell. Indeed, it is surprising what large supplies of certain commodities war-torn countries have on hand even before devastated industries have been restored. The invading troops in Normandy found shoes almost non-existent, but they found food more plentiful than in Britain.

   Better opportunities for war-stricken countries to sell would create opportunities for them to buy the things they will require to restore scattered industries and depleted farms, and would help those countries to get rid of the exchange controls which are now universal. So long as a country is able to expand its exports only slowly and painfully, and is dependent upon foreign loans to prevent the depreciation of its currency, so long will it carefully preserve exchange controls and other restrictions in imports. That is why large advances, either through an International Monetary Fund or an International Investment Bank, can make only limited contribution to the removal of trade restrictions.

4. Permanent monetary and credit arrangements are needed to protect nations against temporary pressure upon their currencies, to permit necessary changes in exchange rates to be made in an orderly manner, and to assure that governments never again will repeat the "beggar-my-neighbor" policies of 1931 and 1932.

5. Finally, the world needs a reversal of the trend toward economic self-sufficiency, which received a strong impetus from the first World War and an even stronger one from the great depression of the Thirties. This does not mean that the efforts of many raw-material producing countries to diversify their industries should be opposed. During the late Nineteenth Century and the first part of

this century, the international specialization of production was carried too far, with the result that many countries became dependent for a large part of their standard of living upon the export of one or two raw materials—coffee, sugar, rubber, silk, wheat, wool, and meat. Between the two World Wars, however, the pendulum swung much too far in the direction of self-sufficiency. Some densely populated industrial countries of Europe (Italy, France, and Germany) even attempted to become self-sufficient in wheat, fats, and sugar. So limited are the natural resources and technical skills of most countries that each one finds many things which it can produce only at prohibitive costs. Between the extreme specialization of the late Nineteenth Century and the more recent trend toward extreme self-sufficiency, a happy medium should be sought.

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What role should the United States play in reconstructing the world's international economic system?

There are those who suggest that the United States be a more or less permanent Santa Claus. They believe that an excess of exports could be financed only by "loans"—loans that would eventually turn into gifts, after producing bitter controversy over why the "debtor" country did not meet its obligations. The persons who assert that full employment can be provided only by an excess of exports are in effect saying that our economy cannot become self-supporting. That is a confession of economic defeatism which a young and vigorous nation should not be willing to make.

The most immediate contribution which the United States can make to world reconstruction is to make itself prosperous.

Prosperity here means a large demand by our industries for imports. The more we import, the easier will it be for foreign countries to meet their large and urgent needs for goods. In 1939, with a gross national product of $100 billion, our imports were $3 billion. After the war, with 55 million people employed and a gross national product of $155 billion, our imports would be about $7 billion or $8 billion.

Not only should the United States make itself prosperous, but it should *keep* itself prosperous. *So important is the United States in the world economy that a depression here is bound to produce a disastrous drop in the price of raw materials throughout the world and to throw most countries into an economic tailspin.*

The United States should support the principle of a large fund to protect the exchanges of the world from temporary pressure. We should not permit differences over the details to prevent its establishment in ample time to be available during the critical period when war-stricken countries will need goods far in excess of their immediate ability to pay for them. *Some* arrangement, even though imperfect in details, will be infinitely superior to no arrangement.

Finally, the United States should take the lead in breaking down barriers to trade. We are the logical country to do this, partly because of our immense domestic market, and partly because for most of the last twenty-five years this country has been able to sell other countries more goods than they have been able to sell to us. One of the greatest contributions which the United States could make to a sound and expanding world economy would be to bring our imports, as soon as practicable, up to our exports. *In other words, the United States, in the long run, should be hard to borrow from but easy to sell to.* The United States should implement this policy (1) by continuing the negotiation of reciprocal reductions in duty, and (2) by accepting exchange rates which make foreign currencies cheaper in dollars than they were in 1939. So great will be the world's need for goods that we can be sure that any dollar exchange earned by sales to us will be converted into American-made goods and will lead to larger exports.

Time was when the United States obtained about eight per cent of its standard of living by sending goods abroad and bringing back other goods. Before the war, however, we were getting less than five per cent of our living by international trade. If, after the war, we were gradually to raise the proportion of our standard of living obtained by trading with other countries to ten per cent of domestic production, our imports would be about $15 billion or $16 billion a year. Our people would be able to buy many things which they now cannot afford, and scores of countries which export raw materials and luxury products would feel the stimulus of rapidly expanding markets. Their expanded demand for road building machinery, mining machinery, machine tools, agricultural implements, locomotives, railroad cars, electrical equipment, trucks, automobiles, and a multitude of products of our factories would create a million or more additional jobs in our factories.

Although the United States would raise its standard of living by increasing its imports and its exports, it should honestly face the fact that the resulting shifts in production and employment would temporarily be painful for some people. The increase in imports would be in commodities which other countries can produce for less than the cost at which much of our output is produced—such as sugar, wool, copper, some fats and oils, wines, winter vegetables and fruits. The increase in our exports would come from those industries in which our superiority is greatest—particularly the manufacturing industries. Finally it would be advantageous, to the country as a whole, to shift a million or two workers from agriculture, where they earn about 60 cents an hour at best, to manufacturing, where they earn better than 80 cents an hour.

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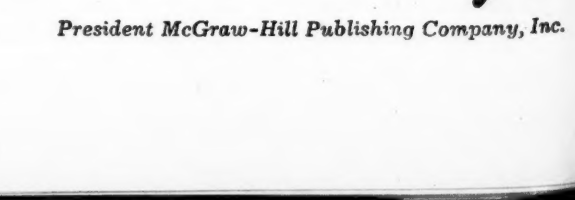
The very fact that in economic matters the rest of the world is dependent upon the United States, exposes our country to great demands and to envy and misunderstanding. The United States must be willing to help the rest of the world, but its help should take the form of assisting other countries to help themselves. Never in all history has one country had such an opportunity to give the world a rising standard of living, to foster conditions under which peace flourishes. What greater tragedy could there be than to make the sacrifices which we are now making and fail to seize this chance to create a world of hope and opportunity in which the spirit of goodwill among nations is able to flourish.



President McGraw-Hill Publishing Company, Inc.

Action Needed on Equipment

Processors should make wants known. Group planning called for

NO PHASE of postwar planning is more important to the future of food processing than improvements in the design and construction of plant equipment. And in the lives of present-day food men, there never has been a more opportune time for planning such improvements than this period. With the need for new machines increasing daily and with the manufacture of them still in the planning stage, the opportunity is rare for reaching an agreement between machinery builders and users as to the changes that ought to be made.

Wartime operations not only have highlighted the inadequacies of many established methods but have shown some of the existing equipment to be cumbersome and unreliable when operating on a stepped-up production schedule. What is more, progressive processors are looking to better products at less cost through machinery that is more efficient and better geared to rigorous quality control. In many instances, this machinery will operate on the continuous-process principle.

Many equipment manufacturers are thinking about making changes, others have put their thoughts into blueprint form, and still others actually have built their ideas into machines. Some of these machines are in war-production use at present. They, or modifications of them, will be made in quantity as soon as construction materials become available. Others are in the experimental test stage.

The Responsibility of Processors

Since processors ought to know more about their production problems, present requirements and future needs than outsiders, they should have a hand in the planning and designing of equipment for their factories. If they are to exert this influence, they must make their needs known. Otherwise, the majority of the equipment builders may complete their postwar designs without full knowledge of the exact requirements and desires of the processors.

While some of the forward-looking equipment builders already have obtained the advice and criticism of the users of their machines, others need such encouragement and assistance.

It is up to the processors to take the initiative in making their requirements known, and they should do this as a group. While individual effort is better than no effort at all, it is likely to be ineffective and smack too much of an individual's pet ideas or impractical ingenuity. Group effort will carry more weight and is more likely to be representative of good technology.

But even group effort on the part of individual food industries has its limitations. Action by industry committees is a step in the right direction, but their activity ought to be supplemented by that of a group representing all of the different food industries that have a common interest in the design or performance of a particular type of machine. Heat exchangers, pumps, conveyors and packaging machines, to take a few examples, are used in many different types of food plants.

An example of commendable action by a group from one industry is found in the confectionery field. Under the auspices of National Confectioners Association, a postwar planning committee has been holding regional group meetings, or conferences. One of the objectives is to arrive at improvements in, and performance specifications for, postwar candy-plant equipment.

As a case in point, steam-jacketed kettles are being studied. To these conferences, the committee invites representatives of firms making kettles and accessories, as well as men who use the kettles and technical men from companies producing the metals of which kettles are fabricated.

From such a meeting, both the makers and the users of kettles obtain information which gives them a better understanding of the other's problems. Similar group meetings deal with other items of candy-plant equipment, to the end that the confectioners have a better than even chance of getting the desired improvements in standard equipment and the new designs suitable for newly developed methods and procedures.

Other food manufacturers are discussing, often individually instead of collectively, similar problems with equipment manufacturers—with profit comparable to the effort expended and the frankness exhibited.

So far so good. Without doubt, much benefit has, and will, result. Yet, there is need for a correlation of all the information that comes out of these individual conferences and industry-group meetings. The day of the specific equipment for a specific industry is passing. In some respects it is past.

The best means of correlating the activities of these forward-looking one-industry group meetings is something for food processors, equipment manufacturers and food technologists to consider.

One Way of Correlating Information

While the Institute of Food Technologists has thus far sponsored and staged only annual conferences of a broad and general character, its constitution provides for other conferences on problems of particular importance. There may be serious difficulties to overcome in enlisting IFT sponsorship of these all-industry postwar planning conferences. But believe that they would add sufficiently to the benefits derived from individual-industry meetings to justify them.

The Talk of the Industry

• MANY do not appreciate the significance of the recent government vs. millers' price-fixing court case in Chicago. Had the government won the verdict, the case would have been the entering wedge in a drive to crack down on the food industries in general. You may thank your lucky star for a judge who had the good sense to cast aside the jury's verdict.

• YOU are short on paper because 700,000 items for the armed forces are "triple-wrapped for your protection." Why so much wrapping? Here's how G.I. Joe explains it:

Steaming humidity?—Moisture-proof cover blocks it!

No lighters or dock?—Float it ashore!

Beach strafing?—Sink it just below tide line!

No cover?—No matter!

Blazing sun?—Let it blaze!

Package falls?—Pick it up, it's unharmed!

The paper that protects G.I. Joe's supplies while he protects your liberty cannot be salvaged. That's why the demand for paper goes up as available lumbering manpower declines. That's why all must save and salvage paper in the food industry. Remember, the paper you save today fights tomorrow.

• CANNED PRODUCTS are the principal food of men on the fighting front, as attested by government purchases totaling 28 percent of the nation's pack of vegetables, fruits and fruit juices last year. This compares with an 8 percent average for all foods. Napoleon really knew what he was about when he inspired Nicholas Appert to perfect the process of canning foods to feed fighters.

• EXPERIMENTS have been made with solvent-extracted sunflower seed as a food material, and pilot plant tests indicate that it will make a very acceptable product. Some will be released soon to the confectionery industry for testing. Once considered as a source of rubber, the lowly sunflower now gives promise of becoming a food.

• LOOK for increased consumer interest in frozen foods postwar. In addition to more activity on the part of frozen foods packers, refrigerator manufacturers are going to "sell" frigid comestibles. Four leading makers of domestic refrigerators are expected to produce two-temperature boxes, with storage space for frozen foods. People who buy these will have to store frozen foods in them, if for no other reason than to prove that they didn't buy a gadget they didn't need.

• "THERE'S nothing mysterious about research. . . . We might just say that research is an organized hunt for facts, and the aim of industrial research is to use these facts to solve specific problems. . . .

"Man's most important job is to create a better life on earth. To accomplish this, he must have knowledge, accurate information, and the tool for attaining this knowledge is scientific research."

Roy C. Newton speaking, Swift's well-known research director.

• BIGGER BUSINESS in baby food lies ahead, if the marriage rate curve in this war parallels that of World War I, as it has so far. The rate went from 10 per 1,000 population in 1915 to 11.1 in 1917, slumped to 9.7 in 1918, then rose to 12 in 1920. In this war, the marriage rate went from 10.5 in 1939 to 13.1 in 1942, then dropped to 11.8 last year. If the parallel with World War I holds, the rate will continue to drop until the soldiers come home to stay, then will rise sharply to a high of perhaps 14 before slumping to a normal level.

This marriage cycle first affects the demand for easy-for-brides-to-prepare foods, then the baby food business.

Incidentally, married couples form a higher percentage of the population now than ever before. Nearly 63 percent of the girls over 14 years of age are married. From 1920 through 1940, the percentage remained unchanged at roughly 60 percent.

Hors d'Oeuvres

• The Russians have sent a sample of their apples to President Roosevelt. Who says that polished-apple diplomacy is kid stuff?

• *With a WFA set-aside order for turkeys, the government started planning the soldiers' Thanksgiving dinner in July. Merry Xmas!*

• It is believed that measurement of the radio-frequency conductivity of eggs in the shell offers an accurate method of evaluating quality. Versatile thing, radio. It not only lays eggs, but can candle them.

• *After stuffing spinach down ourselves and our offspring for years, we hear that the oxalic acid in it hampers the growth of teeth and bones. If nutritionists don't stop changing their minds the public will stop minding their changes.*

• A patent on a process of treating fatty materials has one sentence of 327 words. Apparently patents are not written to read but are close-mesh legal fences woven from yard upon yard of verbage.

• *They say a good blended whiskey can be made with potato alcohol and you can really get peeled on the stuff.*

• A plan is being hatched to fly chickens across the Atlantic to feed liberated peoples in Europe. The idea is to carry eggs over by plane and grow the chicks on the other side. In liberated Europe, at least, the egg will come before the hen.

• *'Tis now rumored that serve-yourself stores handling frozen foods exclusively will be a part of New York's postwar food distribution picture. The housewife will be able to get a dinner complete from frozen appetizer to frozen dessert. Now we're getting somewhere. June brides won't even need a can opener.*

• It is reported that nutritional deficiency in riboflavin might cause fatty liver and sudden and convulsive death. It should oughta happen to Hitler!

• *It is suggested that cottonseed flour will improve the nutritional value of candy. If candy is to be eaten because it's good for you and not because you like it, why not go a step further and toss in the boll weevils. They're high in protein value.*

• When you get red mold on the white surface of blue cheese, what do you do? No, you don't enter your product in a patriotism contest. But you might try covering the cheese with petrolatum containing a mold inhibitor.

• *Scientists at the University of California have synthesized sugar. Next thing you know the OPA will be rationing scientists.*

F. K. L.

From left to right: Lt. Col. Theo J. Pozzy, formerly of Snider Packing Corp., who heads up procurement of nonperishable foods. Lt. Col. Robert W. Hughes, chief of the Subsistence Branch and head of the Market Center. Maj. G. V. (Vic) Hallman, of Continental Can Co. who has developed the processed meat program. Claude Massey, Deputy Controller General of Food in Australia. J. Frank Murphy, Controller General of Food for the Commonwealth of Australia.

On the Australian Scene

A bit of local color and a lot of information about methods and equipment in food plants "down under." There are ideas here for American processors

By L. V. BURTON, Editor of "Food Industries"
Serving as War Correspondent in the Southwest Pacific

AT TIMES it is very difficult to realize that I am far from home. Except for certain minor details one might almost be in an American city. From my window as I write I can see a huge sign advertising Mobiloil. Down on the street is a Yellow Cab. In store windows there are enough of the well-advertised American brands of merchandise to be reminiscent of any town in the United States. The daily newspapers here carry just about as much news from the States as they do of Australian affairs, except for the sports news and results of the weekly horse races. Go to the movies and you see mainly the product of Hollywood. Listen to the radio and you hear music that is chiefly American recordings. The exit music at a theater I attended was "Illinois Loyalty"—the song of my *alma mater*. Most of the automobiles on the street are well-known American cars, although many of them have a strange look because so many are equipped with charcoal gas producers to conserve petrol. The chassis and engines are imported, but the bodies are fabricated here.

There are so many Americans in uniform in some Australian cities that the civilians are in the minority. This is particularly true in what are known as "leave areas," where combat troops are given a holiday and rest from the gruelling fatigue of fighting in the islands "up north."

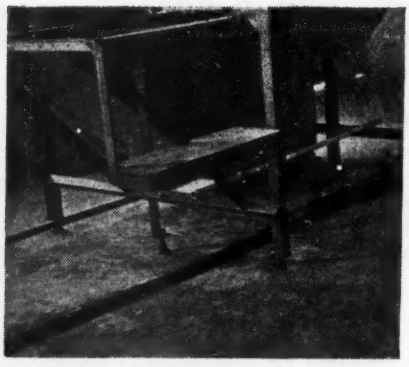
The author samples some Australian beer. On his left is the brewer, Mr. Windon; on his right, the chief-engineer, Mr. Quigley.

The Army has developed its own peculiar slang and traditions. Anyone in uniform who has a job in a city far from the fighting front is a "Fat Cat," and if he lives, as I have recently been living, in a one-room flat is he known as a "B.T.O." (Big Time Operator) or a "Shock Trooper." There is a hint of envy in the latter when it comes from combat personnel.

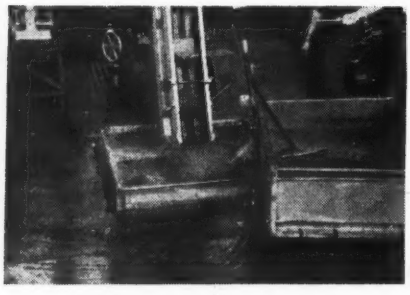
Because I came here under the sponsorship of two Australian government agencies, and hold the credentials of a war correspondent as well, my way has been made very easy, and all doors open readily to me. But I believe that even if I had had no such sponsorship I would have received the same friendly welcome everywhere. Nevertheless, Australians who have visited the United States assure me that what they do in the way of entertaining Americans is nothing compared to what Americans do for the Australians. I hope it is true that the folks at home are really doing a creditable job of entertaining the visitors from "down under."

While a record of social life and customs is perhaps inappropriate in FOOD INDUSTRIES, you will be interested in the industrial sights. But first I want to pay tribute to the Australian food manufacturer for his gracious entertainment of a visiting editor. Without exception, every one of them has given me all the time I wanted, many have used their precious petrol to take me to visit other plants and have arranged that I get around to places I ought to

Recess in floor under equipment provides drainage where it is needed most.



Leg construction which permits leveling of equipment and facilitates cleaning.



Drag conveyor lifts jam from shallow tank truck to filler.

Instruments on panel are easy to read yet are out of way of retort crates.

see. Many have put me up at their homes, and many who were not on my itinerary invited me to visit them at their offices or factories, or asked me to luncheons or to their homes.

Most Australians are overmodest about their progress in food processing. It is true that many of their plant operations are on a smaller scale than those in the United States, but their market is very much smaller than ours. Australia has a population of only 7,000,000.

Recognition of the place of food technology in industrial processing came first in the United States, but I think that in Australia it will come next. If the prominent food technologists in the service of the U. S. Army remain here another two years, their influence and contacts will assure it. The Aussies are coming right along, and I have seen many things here that I doubt if anyone elsewhere has developed. If the ensuing portions of this yarn are old stuff to any readers, lay it to the fact that the food industry of the United States is too large for any one person to visit it all.

Weed Killer

The weeding of carrots has been mechanized by Major Milton D. Miller, QMC, an agricultural specialist from California. He has introduced a spray treatment when the carrots are between the second and fourth leaf, which obviates the need for further weeding. The spray is "power kerosene," not to be confused with ordinary kerosene. One light spraying on a field will do the trick. Certain hydrocarbons and aromatic substances in the power kerosene do the killing. Injury to the carrots occurs if the impurities run higher than 14 to 18 percent. The method is also applied to parsnips, celery-seed beds and all members of the Umbelliflorae family of plants.

Few Standardized Plants

One thing that will strike the visitor from the United States is the absence of standardized ways of manufacturing in those plants which were in existence before the war began. Plants which have been erected or equipped since the war began are, however, strikingly like those of the best design we know at home. This easily can be accounted for by the presence of American food technologists in the U. S. Army. Then U. S. equipment has been imported under Lend-Lease or duplicated by Australian equipment builders under arrangements with owners of the American designs or copies of designs for which patent rights have expired.

Prior to the war, very little food processing equipment was made in Australia, but the conditions are rapidly changing, and high import duties have had much to do with it. But your Aussie food manufacturer in all lines is very much an individualist and is very independent, taking little for granted. He had, before the war, the entire world to draw from, and did so to a very considerable extent.

The nearest thing to a standardized plan in Australia is the flour mill, yet even here one sees a combination of English and American equipment. The next in line is the fluid milk plant, where English equipment predominates. Fruit canning is, however, much the same as it is in California and uses nearly identical equipment. But beyond these three types of plants, it appears that the Australian food processor has studied all the equipment available throughout the world and has tried to find what he has considered the best available to do the job. Whether this accounts for the absence of any specialized equipment companies who will supply a complete plant, or whether the market is too small to justify such a company, is problematical.

Technical Control Developing

Larger food companies employ chemists or food technologists. Most of the smaller ones, which are in the majority, are now beginning to feel the need of technical control. But there are so few trained men now available that the manufacturers will have to wait until the Australian army is demobilized to get enough technical help.

A bit of philosophising is due at this point. When the first Federal Food and Drug law was enacted in the United States in 1906, most of the food manufacturers feared that it would spell ruin for them. What I never realized until I visited Australia is that it compelled the American manufacturer to understand the technical aspects of his business, and that to do this he had to employ chemists and bacteriologists.

Australia has no comparable national food law. It does, however, have a Commonwealth Commerce Inspection service to insure that no exports will give the country a bad name.

The smaller size of the usual Australian plant is another reason why the introduction of technical control has been slower. The cost of laboratories and staffs must be distributed over a smaller volume of goods. This, plus the more rigid price-control system and the higher tax rates, has left little incentive to the manufacturer to add to his ex-

pense regardless of benefits to be derived. It is a safe assumption, however, that when the war is over the Australian food manufacturer is going to employ food technologists as fast as he can find them or train them.

Jam Pump

An interesting materials handling device seen in a jam factory is a vertical, single-acting pump for pumping jam from a tank truck on casters to the filling machine through a 2-in- rubber suction and delivery hose. The pump has a 6-in. cylinder and an 18-in. stroke, with extra-large ball valves and extra heavy springs to hold the valves on their seats. The pump is belt driven, with tight and loose pulleys for starting and stopping. It was designed and built by the company's own personnel some years ago and has been giving perfect satisfaction ever since. It is a good method of handling this sticky material.

Tin Can Problems

There are only a few can factories in Australia, most of the users of packer's cans manufacturing their own as rapidly as they can be filled. When the products are acid, such as fruits or jams, the technical problems of can manufacture are not particularly bothersome. But now that the war has forced the Australian canner into vegetable and meat canning, his needs for perfect containers are greatly accentuated and sometimes go beyond the ability of the existing equipment in his plant. Few modern high-speed can-making lines exist in Australia, and most, but not all, of them are in the hands of can manufacturers. The canners' equipment is chiefly slow-speed, synchronized with the speed of his fillers. Much of it is fairly old and is operated without any automatic can-testing as far as I have seen it.

Almost the first query put to me in Australia was: "What percentage of your tin canisters do you test in America?" My reply was that every can was tested, which caused considerable dismay until we both understood that we were talking about something quite different. When an Australian tests a can he tears it all apart to determine its construction, and it cannot be used again. When an American can manufacturer tests a can in an automatic tester, it is merely to determine if it has any gross leaks. The Aussie has a small expanding gadget that will tear open the side seam to expose the soldering. He also has a pressure tester which will reveal leaks of compressed air up to about 30 lb. of pressure. And he uses a narrow carborundum wheel to cut his seams to examine the cover and body-hooks where we would use a file and strip off the whole end. The grinding wheel, with a thickness of about ⅛-in. and a 5-in. diameter, is mounted on a motor shaft.

Because the greater demands imposed by vegetable canning on the tightness of the container, the spoilage problem among vegetable packers has grown until it is a matter of considerable concern. Some plants have had spoilage as high as 10 percent, due to leaky cans, but most of them have had a much better experience though not yet as good as that of American canners (1 in 10,000).

An outstanding need of all who make cans in Australia, whether it is the can manufacturer or the canner who makes his own, is flexing machines to take the stiffness out of body blanks. Some firms already have obtained them, but most had not. On account of the stiffness of the tinplate, there is a tendency for it to spring partly open as the can leaves the soldering station of the body-forming machine, which results in thick laps or open laps. Both conditions are a contributory or an actual cause of leaky containers.

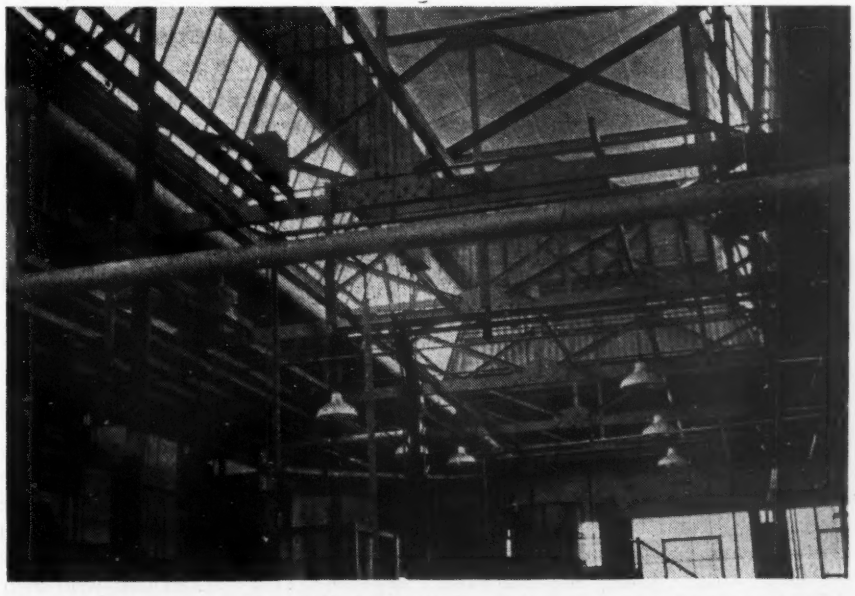
Tomato Operations

Many varieties of tomatoes are grown in Australia that are different from those commonly known in the United States, especially in the central and eastern states. There are Chinese varieties, also Burwood Wonder and Tatura Dwarf Globe, which are the best yielders. But American round varieties have been under test for the past two years and are showing promise. Marglobe, Santa Clara Canner and Pearson have shown considerable merit. The Italian style tomato grown in Australia is regarded by American food technologists as a duplicate of the San Marzano grown in California, which is low in acidity, has little flavor, but has a very solid pulp, a good color and is an excellent shipper. This particular type of tomato is generally used for making tomato pulp to be converted into tomato sauce—the Australian version of American catchup.

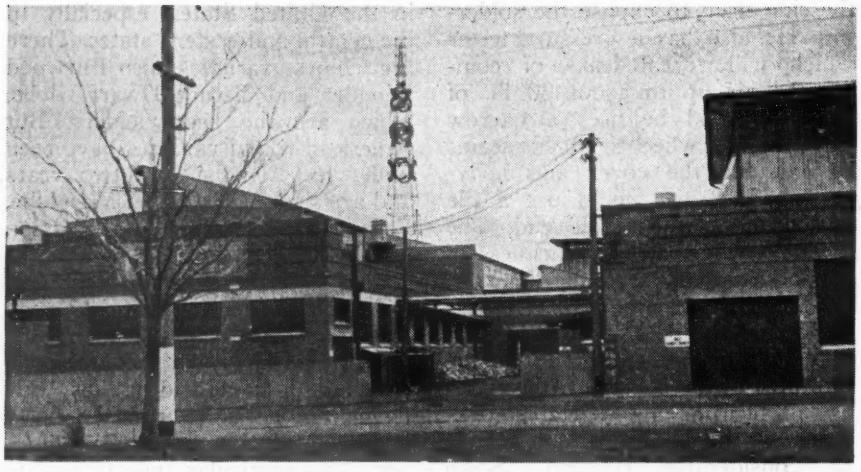
Incidentally, catchup cannot be sold in Australia under its American name—the public simply will not buy it. So H. J. Heinz Co., which has a plant in Australia, sells its well-known product under the name of tomato sauce.

Practice in handling tomatoes in the factory is variable, only part of the plants operating in the orthodox American way. In one plant, all the varieties were delivered together and were sorted out as to type on a special kind of belt, the round types going to the juice line and the elongated types of high-solids content going to the canning and tomato sauce lines.

Some plants are canning the elongated types with their skins on after cutting off the two ends, and cutting the tomato in two across the longitudinal axis. This requires



Type of building construction which facilitates ventilation of steam arising from cooking tomato sauce.



Plant of Shepparton Fruit Preserving Co.

a sharp knife and a firm grip by the operator. This style of pack was instituted as a method of saving labor, but some of the Americans are of the opinion that equal production per operator could be obtained by adequate scalding and subsequent chilling with a cold-water spray.

One of the problems encountered in the past two years is a form of internal trouble locally called "seed rot," or "blossom end rot," characterized by the development of a small amount of rot around the seed at the blossom end, which arises when the plant does not have enough moisture. Where irrigation is possible the disease can be controlled.

Juice tomatoes are the round ones, and are juiced on American equipment obtained under Lend-Lease with a continuous hot-break system to destroy the pectin methoxylase and conserve the tomato pectin, thus reducing the tendency of the juice to separate. Tomato juice is a relatively new product on the Australian market. The flavor is very good, though slightly different from ours, and the acidity seems to be slightly higher than that of tomatoes from the eastern parts of the United States, there being about 0.6 percent acid. Wartime demand originates from the need to supply troops in the hot jungles with plenty of vitamin C.

Juice presses of continuous type are employed by some factories, expressing about half the possible juice, with the pomace going to the pulp line for further expression.

Pulping operations employ the tomatoes that have had to be trimmed and the partially expressed pomace from juice manufacture. Whether the final product be pulp or tomato sauce (Aussie equivalent of catchup), the usual practice is to pass the juice through a finisher before pumping it to the kettles or cooking tanks. Some plants homogenize the juice before cooking it into tomato sauce.

Tomato sauce is usually made in Australia without onion or garlic, has about 18 percent of added sugar and is flavored with spice oils. This sort of formulation permits finishing before cooking, for there is no onion residue to be removed.

One plant has a very ingenious belt conveyor for lowering bottled sauce to a lower floor. An inclined belt, at about a 60-deg. angle from the horizontal, has pairs of wooden flights about 2 in. high that hold the bottles from sliding down. The rate of movement is about as fast as a man can take them off and place the bottles in cases. At the bottom of the lowerator case is a large pile of sawdust to break the fall of any that he may miss.

Pipe Exhaust Box

The familiar American gear type of exhaust box is found in many plants. But at one place I saw something decidedly different. The exhaust was accomplished in the usual atmosphere of steam in a 6-in. pipe through which a chain passed between two small rails extending the length of pipe. Iron legs supported the affair at the usual 30-in. height. Steam was introduced at two points near the middle. To obain the desired length of exposure to steam, several of the units were side by side, with a transfer mechanism that moved the cans from one to the next. For long-time exhausts the canners use as many as five of them in a zig-zag series. The plant owner says that every American who ever saw this gadget becomes quite enthusiastic about it.

Water Supply

Only a few plants have water supplies that permit the prodigality of use so often seen in the United States. Even plants in the more favored regions generally put in a carefully planned water-cooling system which permits reuse of can-cooling water. Few plants have a central water treating system for the water that is used for ingredient purposes or for boiler feed.

Corn Canning

Australian corn canning is based on American recommendations and done with Lend-Lease equipment. The interesting aspect of the operation is the length of the packing season, for corn is available for four months. In one corn plant they have individual cooling tanks which are said to be more effective. A problem at this plant is rather warm cooling water.

United States varieties, such as Golden Cross and certain Iowa varieties, have done very well, but Australia is afflicted with the corn ear worm just as the U. S. A.

Steam-jacketed Retort

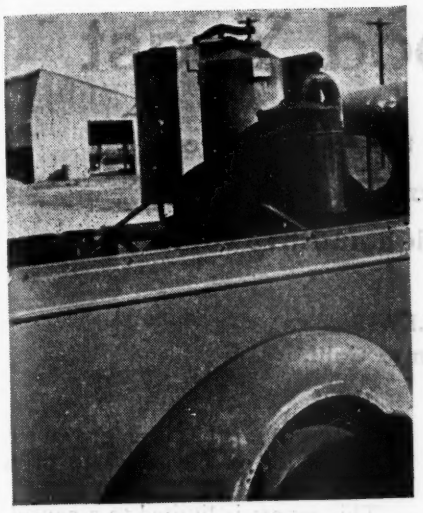
A retort used in some Australian plants has a steam jacket around the lower quarter. It is designed primarily for processing goods in hot water. When in full operation, the hot water surges up the sides and down the center much like a kettle in full boil. When full of boiling water, the retort obviously cannot have any air pockets. With its slower coming-up time, the American food technologists are faced with some nice calculations in order to adapt standard American processes to this type of sterilizing equipment.

Meat Operations

The backbone of Australian economy is the livestock industry, and quite naturally the meat packing establishments are commensurately numerous. One of the things that attracted my attention in some of the plants was the absence of sawdust on the floor of large chill rooms. Although American practice is to the contrary, many U. S. bacteriologists believe that sawdust is a prolific source of bacterial infection which may result in a lower quality of meat.

Novel Smokehouse Control

The Aussies have devised a new type of smokehouse control. Two pickled hams are suspended on a



Charcoal gas producers are often used to operate trucks in Australia because of the gasoline shortage.

scale mechanism with a counterweight that will move downward, and light a signal lamp, when the predetermined amount of shrink has occurred. The smokehouse is then filled with pickled hams, the steam is admitted to radiator coils and the shrinking proceeds until the required amount of moisture is evaporated. When the signal lamp lights, smoking is started and continued until the required color is reached. It is a rather ingenious method of technical control.

Spiral-wound bacon rashers, which would be called sliced bacon in the United States, are packed in a manner that is new to me. A long strip of vegetable parchment, having a width slightly less than the diameter of the can into which it is packed, is laid out on a table. Pieces of sliced bacon are laid on it and the whole rolled into a spiral which is cut off when the diameter is such that it will make a cylinder that will go nicely into a can. Then the can is closed in a vacuum sealing machine and sterilized by heat.

New Type of Retort

A new type of retort door greeted me at one large meat canning plant. The retort was an enormous horizontal affair, about 18 ft. long and 6 ft. in diameter. The door is hung on a huge hinge, suggestive of the hinge on a bank vault, it is so massive. The locking mechanism is its unusual feature, being something like a breech block. To close and lock the door requires the use of a crowbar, inserted into a hole in the hinge. By prying with the bar, the circular door is rotated about one-thirty-second of a turn and draws itself tightly into the aperture to receive it. Around the aperture is a hug V-shaped gasket which is cemented to the retort with the open part of the V toward the center. Steam from a ¼-in. pipe is then admitted to the V-shaped annular space, causing the flexible gasket to spread and make a tight seal between the door and the retort body. Steam is now admitted to the retort by a separate 2-in. pipe and the processing begins. The advantage gained from the mechanism is the saving of time, for instead of tightening about 24 bolts the whole job is done in a matter of seconds.

Flour Mills

Those flour mills which I have seen are four-break mills, equipped with English machinery but with a few pieces of American equipment installed here and there. From the main mill motor are rope drives to the various floors from which the power is transmitted by leather-belt drive. Few Americans have seen rope drives in recent years, but I have a vivid recollection of such a drive in a canning factory in my younger days. The rope broke and it took most of a day to thread it back again and get the place going. At these Australian mills they have a safety device that stops the main motor if there is danger of the rope's breaking. It depends on the fact that before a rope breaks it will begin to fray. A cord is stretched between a small switch and a stationary object, with the cord close to the sheaves. Then if the rope frays, the protruding fibers will strike the cord, open the switch, actuate a relay and stop the mill before a real break occurs.

Australia uses V-belt drives extensively.

Insect Control

Fumigation is the only method I have observed in Australia to control insects in cereal products plants. Apparently no one has tested out the mechanical method of ridding the product of infestation. For military uses, the specification is for the addition of 8 c.c. of ethyl formate per 40 lb. of flour. This is the same treatment that is being used on all dried fruits and macaroni products for military use.

Continuous Butter Making

After many years of effort, a continuous butter making machine has been developed. Wartime restrictions have prevented widespread adoption of the new method, but it seems to work to perfection. Sweet cream is standardized for acidity at 40 per cent butter fat content then passed through a combination volatilizer and pasteurizer for vacuum pasteurization. Then while the cream is retained at 100 deg. F., it is further separated to 82 percent butter fat content in a Danish Titan separator of the foamless elevating type, after which it is forced through brine-cooled chilling rolls of spiral contour. This is said to "shock chill" the hot cream and work it sufficiently to produce a continuous extrusion of butter. The big talking point about this machine, aside from its continuous feature, is the fact that no air is left in the butter and its keeping quality is said to be greatly increased. The butter produced is claimed to score 94 to 95, and the "body" is said to rate the maximum possible score. The one machine which is now in existence is producing forty 56-lb. cubes of butter an hour. I was informed that the continuous process will not work successfully with acid cream because acid-coagulated casein will clog the separator.

Steam-jacket Kettles

Nearly all plants use the tilting type of steam-jacket kettle, and seldom is seen the bottom-outlet type

(*Turn to page* 123)

Kraft-Walker dehydration plant in Australia.

Fruit Juices Yield Food Yeast

Fruit waste materials furnish suitable media for torula yeast propagation. Technic developed for bakers' yeast can be used. Raw material is cheap and plentiful. Product has high nutritive value

By J. J. STUBBS,[a] W. M. NOBLE[b] and J. C. LEWIS,
Western Regional Research Laboratory, Albany, Calif.[c]

SYNTHESIS of protein through the growth of yeast on sugars and simple inorganic materials is of widespread interest at present. Yeast protein, which may make up half or more of the yeast dry substance, is regarded as having high nutritive value, and the yeast substance is an excellent source of B vitamins.[1,2] These factors establish the value of yeast as a component of animal and poultry feeds and as a food supplement for man.

In this laboratory *Torulopsis utilis*,[d] one of the yeasts suitable for food, has been grown in worts prepared from fruit sirups or concentrates of prunes, figs and raisins, and from press juices of apples, pears and peaches. Yields of 42 to 58 grams of dry yeast per 100 grams of sugar were obtained in the laboratory-scale fermenters, while in pilot plant equipment somewhat higher yields were obtained from prune sirup. The yeast had a protein content ranging from 53 to 58 percent as calculated from the nitrogen content. Assays reported for eight members of the B group of vitamins correspond to published values for unfortified bakers' and brewers' yeasts.

Choice of Yeast

Torulopsis utilis was selected because of its ability to utilize the pentose sugars and to grow vigorously on simple synthetic media. In this it differs from the well-known brewers' yeast, *Saccharomyces cerevisiae*.

T. utilis has already been widely studied.[3] It is the organism grown by the Germans during the first World War to utilize the sugar in wood hydrolysates and sulphite waste liquor.[4] British investigators[1] have developed a special strain, *T. utilis* var. *thermophila*, to be grown on molasses in tropical countries. It has been suggested[5] that other carbohydrate materials, such as waste bananas, may prove useful in the production of food yeast, and in this country *T. utilis* has been grown experimentally on citrus waste press juice for feed.[6]

This report is limited to a consideration of yields of torula yeast obtainable from various fruit-juice media, since the United States produces annually large quantities of fruit culls and waste fruit materials. These appear as discarded whole fresh and dried fruits in orchards, packing sheds and drying yards, and as culls, trimmings, peels, cores, and juices at canneries. In a single season large canneries accumulate thousands of tons of such fruit wastes.

TABLE I—Typical Fermenter Record.
(Run 12, Fermenter 3)

In Fermenter at Start

Tap water	2,600 ml.
$(NH_4)_2SO_4$	4 g.
K_2SO_4	3 g.
$MgSO_4 7H_2O$	2 g.
$(NH_4)_2HPO_4$ (20 percent solution.)	10 ml.
Seed yeast (75 percent moisture) suspended in 100 ml. of water	20 g.
Sugar in 220 ml. of peach juice	15 g.

Yeast Propagation

Hour	Nutrients added			Cell volume[1]
	Peach juice (ml.)	NH_4OH (ml.)	$(NH_4)_2HPO_4$ (ml.)	ml.
0	...	..	..	0.15
1	100	10	..	0.21
2	150	10	10	0.32
2½	...	5	..	...
3	200	10	..	0.42
3½	...	10	..	...
4	200	15	10	0.61
4½	...	20	..	...
5	300	20	..	0.81
5½	...	15	..	...
6	300	15	..	1.1
6½	...	15	..	...
7	...	15	..	1.2

Yield Data

Sugar supplied	100 g.
Dry weight of yeast in 15 ml. of culture[2]	0.229 g.
Final volume of culture	4100 ml.
Calculated dry weight of yeast crop	62.5 g.
Dry weight of seed yeast	4.0 g.
Net yeast produced, dry weight	58.5 g.
Moist yeast actually recovered[3]	234 g.
Moisture content of recovered yeast[4]	77 %
Dry weight of recovered yeast	54 g.
Dry weight of seed yeast	4 g.
Net yeast recovered, dry weight	50 g.
Calculated yield	58.5%
Yield, yeast actually recovered[5]	50.0%

[1] Cell volume was obtained by centrifuging 15 ml. of the culture in graduated conical tubes for 3 minutes at a relative centrifugal force of 1250 × gravity.

[2] Obtained by drying the yeast in the centrifuge tubes at the end of the propagation period. The yeast was washed once with distilled water and dried overnight at 90 deg. C.

[3] The cultures were held overnight at 2 deg. C. and the yeast separated next day with the Sharples supercentrifuge.

[4] Moisture was determined by weighing out 10 g. of the freshly separated yeast, suspending it in distilled water and bringing the volume to 100 ml., then pipetting a 10-ml. portion into a weighed dish and drying overnight at 90 deg. C.

[5] Complete recovery of yeast from small-scale cultures was always difficult, therefore the yield of yeast actually recovered was always lower than the calculated yield. See text.

Laboratory-scale Apparatus

Yields of yeast are quite dependent upon cultural conditions, and the operating practice of commercial producers is designed to obtain high yields of controlled quality. The laboratory studies reported here were conducted under conditions similar to those of the commercial process.

The effectiveness of the modern industrial process is due to vigorous aeration of the culture and to maintenance of the sugar concentration at a low level by addition of nutrients only as required by the growing yeast. Maximum yields are possible only when all conditions are optimum for yeast growth. The conditions worked out during the development of the compressed yeast industry, including levels of sugar, nitrogen and phosphate, temperature and degree of aeration, appear to apply as well to the growth of torula yeast if allowance is made for its greater rate of growth.

Laboratory fermenters used for yeast growth experiments must provide means of controlling all of these conditions if results are expected to carry over to pilot- and plant-scale equipment.[7,8] It will be noted later that the maximum yields obtained in laboratory fermenters in this study closely resemble the yields obtained

[a] On military leave.

[b] Now with Consumers' Compressed Yeast Co., Oakland, Calif.

[c] This is one of the four regional research laboratories operated by the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

[d] The name *Torula utilis* has been widely used, but the generic form *Torulopsis* is preferred by modern taxonomists.[1] It will, however, be expedient to speak of "torula yeast."

subsequently in pilot-scale equipment.

The fermenter used in our investigation consists essentially of an upright copper tube 36 in. tall by 6 in. in diameter, with a capacity of 16 liters. Since head space must be allowed for foam, the working capacity is about 10 liters. This permits a maximum crop of approximately 500 grams of moist yeast. The fermenter assembly is shown in the photograph.

Six fermenters are mounted on a movable rack. The brass casting which forms the base of each fermenter is fitted with a 4-in. disk of porous stone. Compressed air enters the base and, issuing from the disk in fine bubbles, passes upward through the culture. The air supply is separately regulated for each fermenter by needle valves and flow meters. A draw-off cock is located at the bottom. The lower part of the tube is surrounded by a water-jacket 12 in. high and ½ in. greater in diameter than the tube. The water jacket is connected to hot- and cold-water supply valves for control of temperature. The interior surfaces of the copper fermenters are coated with bakelite lacquer to avoid solution of copper in the acidic medium.

Fruit Juices Used

The fruit juices were prepared by disintegrating fresh fruit in a hammer mill or a power food chopper, followed by pressing in cloth bags. In some cases it was necessary to filter the juice with the aid of diatomaceous earth to obtain satisfactory clarity. The presence of suspended fruit solids greatly complicates the measurement of yeast yields.

These juices contained 7 to 11 percent of reducing sugar, calculated as invert, as determined by the Shaffer-Hartmann method after inversion with invertase. The fruit sirups used (prune, fig and raisin) were concentrated water extracts of dried fruits with sugar contents varying from 40 to 64 percent.

The utilization of waste dried fruits would involve water extraction and possibly some concentration of the extract. The utilization of fresh fruits would probably require only disintegration or pressing. Filtration could be eliminated if the inclusion of some suspended fruit solids or pulp with the yeast were not objectionable.

Molasses medium, similar to that used to produce bakers' yeast, was occasionally used for comparison. It consisted of 4 parts of beet molasses to 1 part of blackstrap and was prepared as follows: To 600 grams of crude beet molasses, 10 ml. of 1:1 sulphuric acid was added and the mixture was heated in flowing steam for one hour. Then 750 ml. of hot water and 150 grams of cane molasses were added and the mixture was filtered with the aid of Hyflo Super-Cel. The filtrate was diluted with tap water to 3,800 ml. After sterilization at 115 deg. C. for 10 minutes the medium contained 10 percent of sugar and had a pH of 5.0.

TABLE II—Yields and Protein Contents of Yeast Grown on Different Media in Laboratory Fermenters.

Sugar source	Yield, grams of dry yeast per 100 g. sugar [1]	Protein content [2] on dry basis
Molasses	44 to 56	57 to 58
Prune sirup	47 to 56	53 to 57
Fig sirup	52	58
Raisin sirup	50	57
Apple juice	42	58
Pear juice	45 to 47	55
Peach juice	53 to 58	56 to 57

[1] Yields were calculated from the dry weight of yeast centrifuged from an aliquot of the culture.
[2] Total nitrogen was determined by the Kjeldahl-Gunning-Arnold method after yeast was washed twice. Protein = N × 6.25. Because of the presence of purines and other forms of nonprotein nitrogen, estimates of true protein content based upon these calculations are unquestionably high.

Yeast Culture

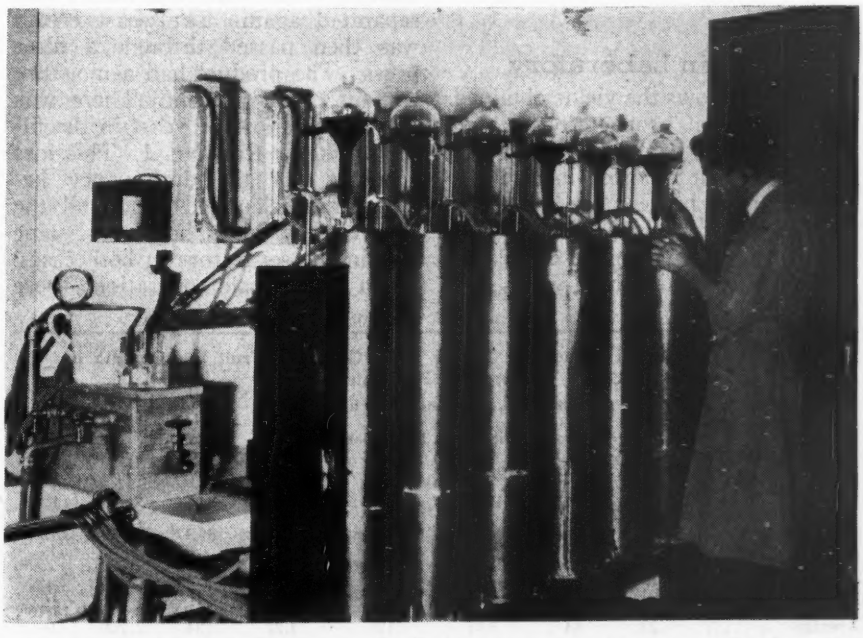
The yeast used is designated as *Torulopsis utilis,* Northern Regional Research Laboratory culture No. Y-900. The stock culture was carried on malt agar slants.

The procedure followed for preparing the inoculum involved more transfers, particularly with respect to unaerated cultures, than are necessary for satisfactory results with torula yeast, but this procedure was adopted for the sake of uniformity when yeasts of more exacting requirements were cultured for comparison.

The medium used for the growth of seed yeast for inoculation of the fermenters contained 20 g. of sugar, 1 g. of ammonium sulphate and 1 g. diammonium phosphate $[(NH_4)_2HPO_4]$, with tap water to make 1 liter. The sugar was provided by the fruit juices or molasses. The medium was adjusted to pH 4.5 to 5 and autoclaved at 10 lb. of pressure for 10 minutes.

Aseptic technic was used in the first steps of propagating seed yeast, which was built up by culturing for 24 hours at 30 deg. C. successively in 10, 30, 100, and 300 ml. of medium. The yeast produced in the 300-ml. culture was then transferred to 1 liter of medium in a 4-liter bottle and the culture very gently aerated for 8 hours through an Aloxite sphere. The yeast sediment from two such cultures was used to inoculate 4 liters of medium contained in one of the copper fermenters.

This culture was aerated at the rate of .5 liters per minute for a period of 8 hours, during which the pH was held at 4 to 5 by addition of ammonium hydroxide. After growth was completed, the culture was stored overnight at 2 deg. C., and the following day the yeast was separated with a Sharples supercentrifuge. More than 100 grams of yeast, containing about 77 percent of moisture, was usually obtained in this manner from each fermenter. This yeast was used as the inoculum, one-tenth of the expected crop being used for each fermentation.



Laboratory fermenters used in propagating Torulopsis utilis on fruit juices.

Laboratory-scale Propagation

The quantities of potassium sulphate and magnesium sulphate required were calculated from data published by Fink and Krebs[9] and were added to the water with which the fermenter was initially charged. Only one-third of the phosphate used (in the form of diammonium phosphate) was added at the start. The remainder was added during the course of propagation as indicated in Table I. The quantities of salts contributed by the fruit juices and tap water were not considered in the calculations, though these undoubtedly were significant. It is also likely that organic substances other than sugars are utilized in fruit juice media.

Ammonium sulphate was used to provide the initial source of nitrogen. Ammonium hydroxide solutions were then added to furnish the remainder of the required nitrogen and to control the pH (between 4 and 5). The ammonium hydroxide solutions were prepared by diluting the concentrated reagent with 9 parts of water. The diluted solutions contained approximately 21 grams of nitrogen per liter.

Air was supplied to the fermenters at the rate of 10 liters per minute, and the temperature was held at 30 deg. C. Foaming was controlled by a few drops of melted lard or Nopco Vegefat Y added as required.

In general the propagation period was 7 hours, but there was a definite leveling off of growth after 6 hours. Very little increase in cell volume was observed between the 6th and 7th hours.

Yields in Laboratory

Table II shows the yields obtained in a number of propagations which were conducted in much the same manner as that reported in Table I. Yields of 50 percent are generally considered excellent. On the basis of such a yield it can be calculated that a ton of fruit which yields 150 gal. of juice containing 10 percent sugar will produce more than 60 lb. of dry yeast. The yield data demonstrate that *T. utilis* grows abundantly on fruit juice media supplemented only by simple inorganic materials. This is not true of the common culture yeast *S. cerevisiae*.

Two strains of bakers' yeast grew poorly on these media. Organic supplements such as corn steep liquor and extracts of malt sprouts, rice bran and peanut meal increased the yield of this yeast but it never exceeded 25 percent.

Pilot-plant Runs

In order to confirm results obtained from laboratory fermenters and to provide torula yeast for feeding tests, two propagations were carried out in a pilot-plant fermenter having a capacity of 250 gal., with prune concentrate as a source of sugar. Air was supplied to the culture at the rate of 70 cu. ft. per minute through a copper "spider," an arrangement of pipes drilled with numerous very small holes placed at the bottom of the tank. The temperature was held at 30 deg. C. by means of a water coil. Ammonia (29 percent NH_3) was added periodically to control the pH and to supply nitrogen to the growing yeast. The ammonium phosphate added at the start represents one-third of the amount used, the other two-thirds being added later as illustrated in Table I. Data for these runs are shown in Table III.

At the end of the 7-hour propagation period the yeast was separated in a Westphalia yeast separator, washed twice with tap water, and separated again. The yeast cream was then passed through a filter press. The product had a moisture content of 78 percent. There was considerable loss of yeast in the filter press for Run No. 1. This loss accounts for the discrepancy between the calculated yield and the recovered yield. There was some loss in the separators in both cases. In a large-scale operation these losses could be practically eliminated.

TABLE III—Pilot Scale Fermentations on Prune Medium.

	Run 1	Run 2
In Fermenter at Start		
Tap water	645 l.	795 l.
$(NH_4)_2SO_4$	500 g.	1,000 g.
K_2SO_4	570 g.	570 g.
$MgSO_4 7H_2O$	430 g.	430 g.
$(NH_4)_2HPO_4$	300 g.	300 g.
Prune wort, 17 percent sugar	34 l.	24 l.
Seed yeast (4,250 g. of yeast, 75 percent moisture)	76 l.	76 l.
Yield Data		
Total sugar supplied	20 kg.	19.7 kg.
N supplied as ammonium salts	297 g.	403 g.
N supplied as ammonia	1,010 g.	980 g.
Total N supplied	1,307 g.	1,383 g.
Final volume of culture	758 l.	974 l.
Dry wt. of yeast in 15 ml.	0.256 g.	0.191 g.
Dry wt. of yeast in culture	12,910 g.	12,380 g.
Dry wt. of seed yeast	980 g.	980 g.
Dry wt. of yeast produced	11,930 g.	11,400 g.
N content of dried yeast	9.2%	9.2%
N in yeast produced	1,098 g.	1,049 g.
Calculated yield	60%	58%
Yeast actually recovered[1]	39.4 kg.	42 kg.
Net yield based on recovery[1]	39%	42%

[1] The calculated yield is believed to be more indicative of results to be expected in commercial practice than the net yields based on actual recoveries in these runs. See text.

It previously has been pointed out (Table I) that there was a loss during the process of recovery of yeast from small-scale fermentations. The amount of this loss will vary with the kind of equipment used to separate the yeast, but in a commercial operation where thousands of pounds of yeast are handled it will be negligible. For experimental purposes the most significant yield data are obtained from the calculated amount of yeast in the fermenter at the end of the propagation period.

The pressed yeast was passed through a Hobart food machine and extruded in the form of "ropes" of 3/8-in. diameter. These were dried for 7 hours at 66 deg. C.

The yeast obtained had a dark color, apparently due to absorption of a pigment from the prune medium. The pressed yeast was somewhat gray, whereas *T. utilis* is normally a pale tan color.

The dried yeast was ground in a hammer mill. The powder contained 9.2 percent total nitrogen or 57.5 percent protein.

No attempt has been made to calculate nitrogen balances. Fink and his coworkers have done this.[3] It appears that the maximum amount of yeast protein is obtained under the usual conditions for maximum growth, provided that sufficient nitrogen is available to the yeast. This nitrogen is easily and economically supplied as ammonium hydroxide.

(*Turn to page* 125)

TABLE IV—Vitamin Content of Torula Yeast Grown in Fruit Juice Media in Laboratory Fermenters.

All assays reported on a dry basis

Substrate	Number of samples	Thiamine (p.p.m.)	Riboflavin (p.p.m.)	Nicotinic acid (p.p.m.)	Pantothenic acid (p.p.m.)	Biotin (p.p.m.)	Pyridoxine (p.p.m.)	Inositol (p.p.m.)	p-aminobenzoic acid (p.p.m.)
Molasses wort	1 to 2[1]	18	34;36	610;645	111;141	1.31;1.06	34;36	.....	11;16
Prune concentrate	1 to 14	7 to 42	31 to 61	450 to 690	106 to 180	1.08;1.68	36;47	2,850	18;40
Fig sirup	1	9	47	450	154	.....	....	....	....
Raisin sirup	1	14	43	415	143	.....	....	....	....
Apple juice	1	14	38	375	120	.....	....	....	....
Pear juice	1 to 3	9;17	24;41	385;485	109 to 120	1.42	31	....	17
Peach juice	1 to 3	12;27	26;45	440;570	131 to 159	1.50;1.57	28;29	2,500	15;16
Average	....	22	44	535	139	1.37	34	2,700	19

[1] The number of samples used for each assay varied; all values are given if only one or two samples were used — otherwise a range is indicated.

Research Reveals New Facts For Food Technologists

Findings in U. S. Department of Agriculture laboratories contribute new knowledge useful to food processors. Highlights presented here pertain to meat, eggs, starch, citrus fruits, pectin and fats and oils

INTERESTING and significant new discoveries in food technology have been made by the various laboratories of the U. S. Department of Agriculture. These were highlighted in a report by the Administrator of Agricultural Research to the Secretary of Agriculture.

Herewith is presented, in an abstracted form, some of the items of particular interest to food technologists.

Dehydrating Meats — Chemical and biological tests have shown dehydrated pork, beef, lamb and mutton to be wholesome, readily digestible and nutritious. The method most commonly used to produce an acceptable product is the vacuum rotary process. This method, besides being rapid, combines preheating and dehydration in the same operation. The vacuum feature reduces the exposure of the meat to air, thus lessening the chance for oxidation of fats and at the same time improving its storage quality. In addition, the vacuum makes possible the dehydration of the meat at lower temperatures, which favors the retention of the characteristic of uncooked meat with better flavor.

Continued study of the packaging of dehydrated meats confirms previous findings that tin cans are superior to any other container for this purpose. The chief advantages are freedom from leakage of air or moisture into the container and of fats from it, which occurs when the atmospheric temperature is high.

Studies on rehydration show that the product, in order to approach fresh meat in palatability, needs to absorb an abundance of moisture. A low-fat, high-protein small-sized particle and freedom from case hardening during precooking favor satisfactory rehydration.

Vitamins in Dried Eggs—There appears to be no appreciable loss of vitamins in spray drying. However, when the dehydrated eggs are stored at elevated temperatures of 98.6 deg. F., 60 percent of the original vitamin A content is lost in one month. When stored at lower temperatures, the losses in that period are much reduced. Compressing the dried powder into blocks or adding antioxidants to the emulsified mixture before drying increases retention of vitamin A in the powder to a marked degree. One of the most effective antioxidants investigated was alpha-tocopherol. Preliminary experiments indicate that pads of activated charcoal placed inside at the ends of a waxed paper container filled with dehydrated whole egg powder help to maintain the characteristic odor of the fresh material even when stored at elevated temperature of 98.6 deg. F. for 40 days.

Powdered Jelly — Spray-dried powders, prepared from boysenberries and grapes, can be converted into excellent jellies by adding suitable quantities of sugar and water and cooking for a short time. It is said that an excellent base for grapefruit marmalade can be prepared by dehydrating separately the sliced cooked peel and a puree from the rest of the fruit. The pureed pulp is admirably adapted to drying on internally heated revolving drums even without the addition of sugar.

New Uses for Starch—Tests were made by the Northern Regional Research Laboratory on extracting starches from the bulk of the available varieties of glutinous corn and sorghum by methods closely approximating that used for the commercial production of cornstarch. Sorghum gave processing difficulties in proportion to the amount of color in the seed coat. However, good-quality starch was obtained after removal of the coat by pearling. The starches from glutinous corn and sorghum were found to have properties similar to those of tapioca starch and to yield dextrines superior to those from tapioca.

Many methods proposed for separating starch into two fractions were tried out, and two or three seemed to be commercially practicable. The fractions differ in physical properties, and the probable explanation is that the molecules of one fraction are linear molecules. This is the more promising as a raw material for film, fibers and plastics, and constitutes about 25 percent of cornstarch. When acetylated, it can be made into strong, pliable transparent films like cellophane, whereas the other fraction, when acetylated, yields weak, brittle films. It was found that the starch acetate films made from the former fraction are very similar to cellulose acetate films. Flow tests made on starch acetate from the fraction having linear molecules showed that it is a good thermoplastic suitable for molding.

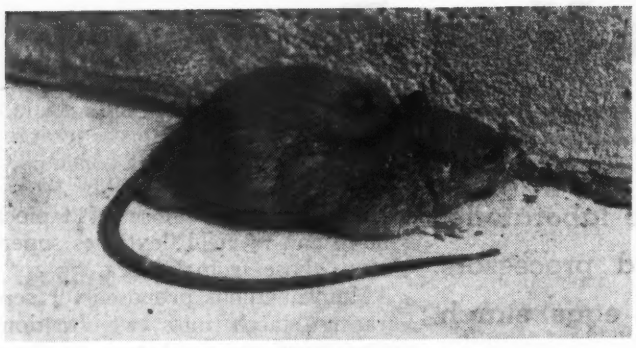
Reducing Rancidity—When the moisture content of cottonseed is less than 10 percent, there is no appreciable formation of free fatty acid during six months of storage. But when the moisture content is higher, fatty acids are formed rapidly. Cottonseed treated with gaseous ammonia did not heat in storage, and there was less hydrolysis of oil to free fatty acids and glycerine. The color of the extracted oil was improved in comparison with that of oil from untreated seed.

A means has been found for the prevention of rancidity in vegetable oils both by preservation of the natural antioxidants during refining and by the addition of synthetic antioxidants. Concentrates of the natural antioxidant alpha-tocopherol were prepared from peanut oil and its hydrogenation products.

Fat-soluble compounds of ascorbic and isoascorbic acids act as antioxidants when added to lard and give promise of being practical agents for preventing rancidity.

Vegetable Butter—A combination of controlled hydrogenation and low-temperature solvent fractionation was used to produce a hardened fat from cottonseed oil having the con-

(*Turn to page* 134)



Roof rat

Norway rat

HOW TO ROUT RODENTS

These detailed methods of poisoning, trapping and gassing will rid a food plant of rats, but the extermination will gain little if you overlook the measures outlined to keep the rodents out

By BERNARD P. KOLKANA, Director, Rodent Control, Department of Public Health, Jacksonville, Fla.

PROPER preventive measures plus good "rat sense" should keep a food plant relatively free from rodents. And one of the first considerations in the control of these pests is a working knowledge of their characteristics and habits, for there are three different species of rat that normally infest food plants in the United States.

The fellow we all know best is the heavily built, blunt-nosed Norway rat, which is known also as the wharf, sewer, brown or house rat. He keeps to the lower floors and basement, seldom climbing, as he is essentially a burrowing animal, which lives and breeds underground.

The roof rat is smaller than the Norway, slender and with a pointed nose. It has unusual climbing ability and its dark runways, or paths, often may be seen on overhead pipes or wooden crosspieces. It is prevalent only in the Southern states and coastal cities.

The third species, the black or ship rat, is a true brother to the roof rat except that its color is a bluish black. Both the Norway and the roof rat are grayish brown.

Rodent-control specialists, health department officials, and pest-control men all have their ideas about controlling rats. It is usually agreed, however, that there are four major steps. These are, in their most effective order: rat proofing, rat-harbor elimination, sanitation and baiting or trapping. To have permanent rat control within a building, it is necessary to use a combination of all these procedures. Rat proofing is the most effective because of the permanent results achieved.

Rat Proofing

In food plants and warehouses, the cost of rat proofing is usually less than normal loss by rat destruction in a two- or three-month period.

In rat proofing a plant, it is necessary to look upon each building as a unit. The roof, all outside walls and the foundations must be absolutely tight. It is best to start at one outside corner of the building and work around it, inspecting all lower windows, doors, pipe entrances and other openings to see that none has an aperture of over ½ in. Next, all ventilators and doors on top of the building must be checked to see that they fit tightly and close properly. If the building has a basement, all foundation walls should be checked from the inside, all cracks and pipe entrances should be sealed with concrete mortar, and floor drains should be fitted with ½-in. metal gratings. The following methods and materials are recommended for use in rat proofing a building:

1. Protect doors with 24-gage galvanized sheet iron flashing. The flashing should extend upward 3 in. on each side of the door and from 6 to 8 in. at each edge of the door.
2. Where pipes pass through walls, use 24-gage galvanized sheet iron flashing or a strong mix of concrete mortar.
3. Install 16-gage, ½-in. mesh, galvanized wire cloth securely over existing ventilator grill. All fan openings in walls also must be screened. Cast iron grill ventilators should not have openings larger than ½ in.
4. Lower windows should be protected with 16-gage, ½-in. mesh, galvanized wire cloth.
5. Basement openings must be covered with 16-gage, ½-in. mesh, galvanized wire cloth.
6. Repair and flash outside basement doors with 24-gage galvanized sheet iron.

Snap trap, with mounted cardboard, set on roof rat runway.

In rat proofing a building, it is essential to find and repair (or close) every opening. Concrete used for this purpose must be poured in the morning, so that it may harden before night, since rats will gnaw through semisolid material.

After rat proofing is completed, a reliable plant employee should be appointed to inspect the buildings every two weeks to insure the proper upkeep. Doors that are in constant use might sustain a broken panel, or become misshapen. These should be repaired immediately.

Electricians, plumbers and other service men have little regard for a

rat-proof building. They make pipe and cable entrances several times larger than is necessary, and they seldom close the unused portion of the holes. Service men also have a habit of leaving the access entrances beneath buildings open after they are through working. Rats readily find these openings and make them into main avenues of entry into protected buildings. Considerable time and expense will be saved if a check-up is made immediately after any repair work is done.

Rat-harbor Elimination

Rat-harbor elimination involves removing or destroying those places where rats live and make their nests. The surest way to keep rats out of food plants is to remove all favorable shelters. They will not remain where safe shelter is not available. Permanent rat harborages in a building are structural and consist of spaces within double walls, ventilating systems, under floors, above ceilings, and encased spaces under stairways. In a properly planned food factory or warehouse, such harborages would not exist, but many existing food buildings were not properly planned.

Double walls should be shut off by closing the openings between the studs and floor joists with 26-gage galvanized sheet iron. Wooden ground floors should be replaced with concrete floors at least 3 to 4 in. thick, with curtain walls extending underground at least 2 ft. Below the surface where concrete is not practical, 26-gage galvanized sheet iron may be used. Double ceilings and stairway enclosures usually can be eliminated without much trouble.

Temporary harborages—such as piles of boxes, crates, old machinery, pans and equipment—should be checked thoroughly and all unusable materials disposed of. Most plants have several rooms of obsolete objects that are of little value. These rooms harbor enough rats to infest the entire building.

Storing Supplies

Supplies of materials—such as food products, cartons, wrapping paper, and numerous small items—also harbor rats. These materials should be stored in a manner that will provide the least amount of shelter. Supplies always should be placed upon skids at least 8 to 10 in. above the floor, and the skids should be arranged in rows with adequate space between for an individual to pass. Never stack materials directly against a wall, as this makes an ideal hiding place. It is advisable to space materials at least 2 ft. from walls to allow enough room for cleaning, inspection and placement of poisoned bait when necessary.

It is necessary not only to eliminate harborages on the inside of the building but to get rid of them on the outside. Rats from the yards or adjacent lots often dart into a building through an open door. Piles of building materials or old equipment should be straightened and all unusable materials disposed of. Lumber, boxes, drums and similar materials ought to be piled at least 18 in. above the ground. Then the weeds should be cut and the trash removed from adjoining lots. Trash and refuse should not be permitted to accumulate any place inside or outside the building.

Sanitation

Sanitation, in rat control, is the elimination of all waste food materials that may be eaten by rats. Garbage from the plant must be disposed of or put in closed, rat-proof containers every night. Food scraps must not be allowed to accumulate under or behind machinery, and floors should be cleaned daily, especially in the corners and around equipment. Rats tend to feed on these types of materials rather than on sacked or stored supplies.

Control measures include baiting, trapping and gassing. These methods, however, must be regarded as only temporary. Unless other steps are taken, they will only decrease the rat population for a limited time.

Poisoning

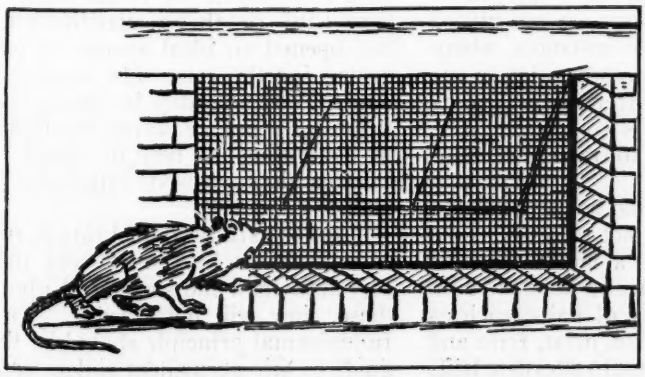
Poisoning has the most widespread use and is the most effective. Only responsible individuals, however, should be allowed to place poisoned bait in food plants, as most of them are dangerous to men and animals other than rats. In most cases, baits should be put on floors, along walls, in runways, or where the rats are most prevalent. Never place them on bags or containers of food, on shelves of cabinet above open containers of food, above processing equipment or in processing rooms.

Poisoned baits should be small—about a teaspoon in quantity. Many small baits are more effective than a few large ones. Several kinds should be put out on the same night, as some rats prefer different foods. Be sure to supply plenty for all the rats. Those that do not receive a lethal dose will not readily accept bait in the near future, and the unharmed rats will become suspicious and hard to poison. When the rats do become suspicious, prebaiting with unpoisoned foods for three or four days goes far to allay their fears. The less available food there is in the plants, the better will be the acceptance of bait.

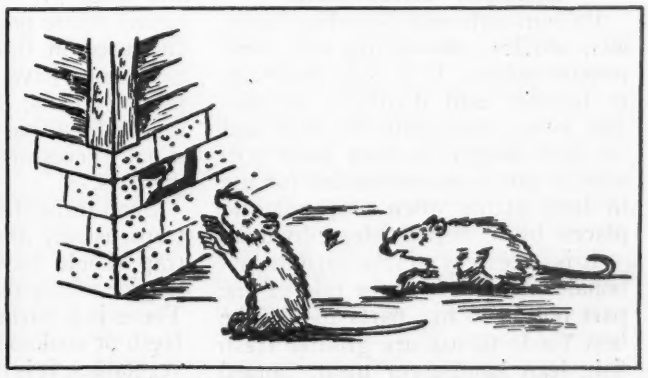
For Norway rats, baiting in the basement and on the ground floor usually is successful, and this practice decreases the possibility of their dying in the walls and between floors. To exterminate roof or black rats, it is also necessary to bait the attics and upper floors.

Bait should be distributed in the evening as it will then be fresh when the rats start feeding.

Any number of acceptable foods can be used in poisoned baits. The type of plant, time of year, weather condition, location of plant and kind of rat all affect the selection of the bait. Usually the best accepted food



Tight screens will bar the way to a favorite rat entrance.



Close openings and cracks in foundation walls with concrete.

is the one that the rats are feeding upon in the plant. The opposite type of bait, however, sometimes is readily accepted. But the best procedure is to place at least four or five different kinds of baits. The general order in which rats will accept food is as follows: (1) Ground raw fish, (2) ground raw lean beef, (3) bread, (4) ground pecan nutmeats, (5) canned fish, (6) fresh tomatoes, (7) cantaloupes (in season), (8) rolled oats and (9) cornmeal.

Red Squill

The ideal poison is one that is tasteless, odorless and specifically suited to rat control. It should be a slow-acting poison, so that the rats will be found before they die. It should be highly toxic for effective results. Red squill is the only poison that is specifically for rats and is relatively harmless to man or domestic animals. Squill is highly objectionable to some animals because of its taste. It acts as an emetic when taken in toxic dosage; and since rats do not vomit, death results from paralysis in one to five days.

One of the best red squill baits is made with one part red squill, two parts rolled oats, and seven parts ground fresh fish. Weigh all ingredients accurately. Add enough water to the squill to make a paste. Mix moistened squill and ground fish first, then slowly add the rolled oats. A small quantity of water may be added to make a moist bait. Small whole fish usually are the most satisfactory to grind. Fresh ground beef, canned salmon, canned mackerel or sardines may be substituted. Use the liquid from the canned foods to moisten the squill. Tomatoes, sweet potatoes, cantaloupes and apples may be diced into ¾-in. squares or small slices and dusted with red squill powder. Two small diced tomatoes per ounce of poison will give the approximate proportion to use.

Barium Carbonate

Barium carbonate is a white, tasteless, odorless, slow-acting and inexpensive poison. It is toxic, however, to humans and domestic animals. But being comparatively mild and far less dangerous than most poisons, it can be recommended for use in food plants when prepared and placed by a responsible individual.

It is necessary to mix barium carbonate with foods at the rate of one part poison to five parts food. The best foods to use are ground fresh fish, lean hamburger meat, canned salmon, canned mackerel, dried bread crumbs, cornmeal or rolled oats. The powdered barium carbonate should be thoroughly mixed into the bait material, then enough water added to give the bait a moist, doughy appearance. Make up several different kinds of baits so rats may have their choice. It is almost impossible to dust enough of this poison powder on fresh fruits and vegetables to produce results that are satisfactory.

Phosphorus

Phosphorus (zinc phosphide) has a distinct odor and taste, but nevertheless, the bait mixtures are attractive to rats. This poison is not normally recommended for public use, due to its high toxicity. Commercial preparations may be used according to directions. If fresh zinc phosphide can be purchased at a local drug firm, it may be used in the proportion of one part zinc phosphide to 100 parts of bait material. Two-thirds of a teaspoonful per quart of diced tomatoes, apples or sweet potatoes makes a highly acceptable bait for roof or black rats. The bait should be placed in a container four or five times as large as the quantity of bait. Rotate and shake the container while the poison is sifted over the top.

Only a responsible person should be allowed to prepare and place these baits, which are dangerous materials to handle.

Other Poisons

Arsenic, strychnine and thallium sulphate are all used extensively by rodent-control specialists and commercial men. They are highly toxic, with many advantages as well as disadvantages that are well known to those who use them. They are not recommended for use in food plants unless they are in the hands of an experienced individual.

Use of Traps

Trapping is almost as effective as poisoning, but it requires more skill and labor. It may be employed in rooms where poisons are not placed and used in those instances where a few rats have become wise to the poisoned baits. After the rat proofing and baiting is completed, it is usually necessary to trap the remaining rats.

Snap traps should be used, as cage traps usually are not effective. The trap should have a large, sensitive trigger with a place to hold the bait. There is a variety of baits, such as fresh or cooked fish, meat, fruit and vegetables. It is best to alternate baits on the different traps. When rats become wise to the traps, it is well to bait them several days without setting them. A strong piece of cardboard 2½ in. square may be mounted on the trigger of the trap. This provides a larger surface for the rat to step on. These traps are then set along walls at right angles and in narrow runways. They are also effective for use on the overhead runways of both the roof and black rats.

Gas Effective

Gassing is one of the most effective control measures for rats located in burrows, under concrete foundations, piles of rubbish or similar harborages. Calcium cyanide dust is a compound that gives off hydrocyanic acid gas when it comes in contact with the air. This gas, in sufficient concentration, is deadly poisonous to all animal life. The dust should be forced into the rat harbors by means of a regular dusting pump. Never use calcium cyanide in a closed structure without wearing a proper gas mask.

A Personal Experience

One of the larger bakeries here in the city of Jacksonville had been having considerable trouble with rats for some time. After a complete inspection, rat proofing, rat harbor elimination and sanitation steps were thoroughly carried out. This was followed with a systematic baiting job to destroy the rats locked in the building. The rat population decreased to a minimum. Snap traps were set on runways to catch the remaining rats.

The bakery was rat free for several months, then rats were seen in the bread department. The building was checked for openings where rats could enter, but none were found. Finally it was decided to go to the plant at night and observe the activities of the pests. The trouble was located immediately. The night crew of bakers was propping one of the back doors open for better ventilation. Little did they realize that they had opened an ideal avenue of entrance for the rats. The condition was remedied readily by the installation of a proper screen door and by cautioning the help in regard to keeping doors closed, especially at night.

To successfully control rats in any plant, it must be remembered that rats need food and shelter. Without these, they will not survive. This fundamental principle should be the guide to any permanent rodent control program.

Samples of frozen Elberta peaches packed 12 oz. of sliced peaches and 4 oz. of 65 percent sirup per carton, stored 1 year at 0 deg. F., then thawed and allowed to remain at room temperature for 24 hours. The samples were treated as follows: l-ascorbic acid, No. 2, 0.25 percent; No. 1, 0.125; No. 5, 0.025; and No. 6, 0.010; d-gluco-ascorbic acid, No. 4, 0.25 percent and No. 5, 0.025; d-isoascorbic acid, No. 7, 0.125 percent. No. 8 was the control and contained the untreated sirup.

No Browning of Cut Fruit When Treated by New Process

By DONALD K. TRESSLER, Westport, Conn., and CLARENCE DuBOIS, Baton Rouge, La.

Ascorbic acid in solution prevents browning and flavor loss in easily oxidized fruits when cut for use in baking or for freezing or canning. The treatment does not affect flavor and adds to the nutritive value

WHEN easily oxidizable fruit is treated with ascorbic acid, the product does not discolor readily, nor does it readily take on off-flavors because of oxidation. The effectiveness of ascorbic acid, and of its isomers, in inhibiting the browning of peaches has been under test for the past six seasons by Frosted Foods Sales Corp. and by Olney and Carpenter. More recently, the use of ascorbic acid and its isomers has been suggested for inhibiting discoloration during storage of peaches canned in glass or tin.[1]

When certain fruits are cut, broken or bruised and exposed to air or oxygen, they turn dark and become unattractive in both color and flavor, due to the presence of catechol tannins, with or without other easily oxidizable substances. This particularly affects peaches, apples, plums, apricots, pears and white-fleshed cherries. In preparing such fruits for use fresh, in pies or for canning or freezing, the peeled or sliced fruit must be handled expeditely or else the cut surfaces are affected to such an extent that the product is not only of inferior color but also of poor flavor. This darkening and change of flavor is particularly objectionable when the product is marketed to the bakery trade as fresh sliced fruit and in fruit which is to be preserved by freezing. In the latter case discoloration not only occurs during preparation but slowly continues

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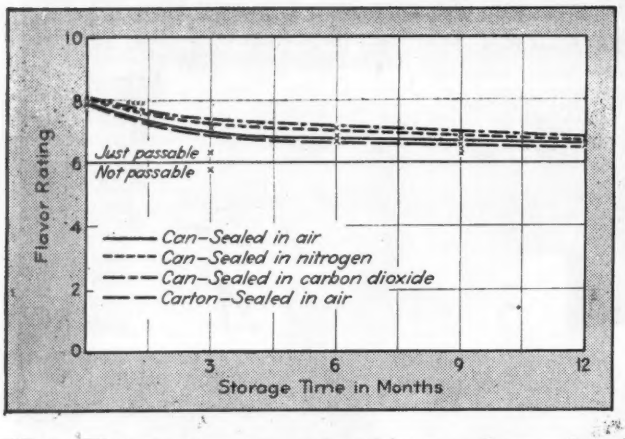


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated beets with regular moisture content at 75 to 80 deg. F.

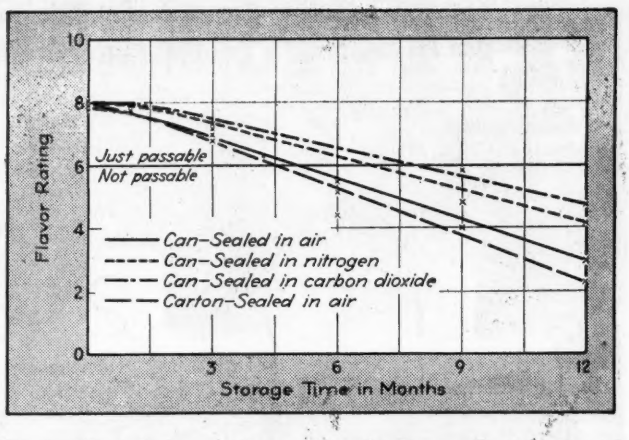


FIG. 2. Effect of storage time and packaging on flavor rating of dehydrated beets with regular moisture content stored at 98 deg. F.

New Facts About Packaging And Storing Dehydrated Foods

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago, Ill.

Dehydrated beets retain most of the original flavor and color for at least a year if stored at 80 deg. F. or below. Their keeping quality is affected only slightly by different packaging methods, extensive tests show

PART VIII—DEHYDRATED BEETS

DEHYDRATED BEETS make an attractive food when properly prepared. They compare favorably with beets as ordinarily purchased and prepared for the table. They are a poor source of both thiamine (vitamin B_1) and riboflavin (vitamin B_2).

Most of the original flavor and color can be preserved for a period of at least one year provided the product is not subjected to temperatures above 80 deg. F. for more than two or three months. The riboflavin in the product is quite stable; the thiamine is also stable except at temperatures above 98 deg. F. Packing in an inert atmosphere is of only slight assistance in retaining quality.

When compared to other dehydrated foods, dehydrated beets are moderately stable at high storage temperatures. They are still passable after six months at 98 deg. F. Storage at 130 deg. F., however, makes them inedible in one month.

Other things being equal, a moisture content slightly lower than the 5 percent now specified results in a slight improvement in keeping quality.

These conclusions are based on the results of examinations during one year of storage.

Samples for this experimental pack were from the Rochester, N. Y., plant of the Beech-Nut Packing Co. They were originally packed in 5-gal. square cans on Feb. 1, 1943, from beets dehydrated on that day. They were taken to the New York State Agricultural Experiment Station, at Geneva, and there repacked in cans under the various conditions outlined in Part I of this report (FOOD INDUSTRIES, March, 1944, page 63).

The fresh beets were of the Detroit Dark Red variety and had been in storage approximately two months at a temperature of 32 to 40 deg. F. before drying. They were cut into $\frac{3}{8}$-in. cubes and steam blanched in a retort under pressure for 7 minutes at 240 deg. F. preparatory to dehydrating in a center-exhaust tunnel of the Eidt design. The beets were in this drying tunnel for 4 hours. During that time their

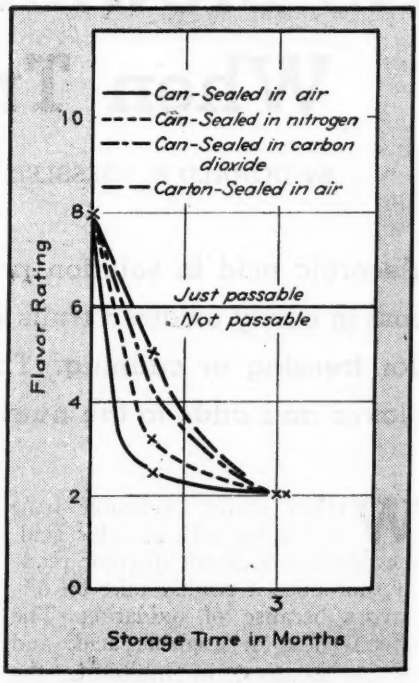


FIG. 3. Effect of storage time and packaging on flavor rating of dehydrated beets with regular moisture content stored at 130 deg. F.

moisture content was reduced to approximately 8 percent. Dehydration was completed in a finishing bin where they remained 22 hours at a temperature of 140 deg. F. to bring them to the 5 percent moisture content allowed by Army specifications.

The staff of the New York State Agricultural Experiment Station assisted in making the experimental pack on February 2. One-half of the total amount of beets received from the Beech-Nut Packing Co. was placed in an experimental dehydrator at the Experiment Station and subjected for 6½ hours to a temperature of 150 deg. F. in flowing air having a very low relative humidity of approximately 5 percent. Disappointingly, this procedure reduced the moisture content only slightly more than 1 percent, to give beets with slightly less than 4 percent moisture content. Test samples of both moisture levels were then packaged separately. Cans only were packed at Geneva, but a sufficient number was hermetically sealed in air so that samples of the paper containers could be packed from them at the Chicago laboratories. This packaging was completed and all samples were stored on Feb. 11, 1943.

In the course of this study the following modifications were made to the regular examination procedure as outlined in Part I.

1. Color: Several attempts were made to match the color of these dehydrated beets without much success. The available color disks would not satisfactorily duplicate the combination of redness and blackness that is characteristic of dehydrated diced beets. Color comparisons were made during the earlier examinations but a later decision that the numerical color notations were of little value resulted in them not being reported.

2. Reconstitution: All the flavor tests, pH readings of cooking liquor and drained weights were made on cooked beets prepared according to the following formula: 10 grams of dehydrated beets are added to 100 c.c. of water and allowed to stand for 30 minutes. After this soaking time, the mixture was slowly brought to a boil in about 15 minutes of elapsed time and simmered for an additional 30 minutes.

pH readings were made on the resulting cooking liquor with the aid of a glass electrode.

3. Because the product stored at 130 deg. F. deteriorated so rapidly, examinations of these samples were discontinued after three months.

The following observations are based on visual inspection of the samples during the several examinations.

In general, there was no difference in color among the differently packaged samples stored under similar conditions. The color of the product stored at 75 to 80 deg. F.

TABLE I—Results of Examinations of Dehydrated Beets Stored at 75 to 80 Deg. F. (Room Temperature).

A—Regular moisture content—4.9 percent
B—Lower moisture content—3.7 percent
Peroxidase activity—both A and B—negative

Storage time	Package	Flavor rating		Drained weight (grams)		Vitamin content (mg./100 gm.) Thiamine		Riboflavin		Gas analyses $\%O_2$		$\%CO_2$		pH	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	7.9	7.7	61	59	.....	.....	.....	.....	....	....	....	....	5.3	5.2
	Can—N_2	8.0	7.7	59	60	.....	.....	.....	.....	1.6	1.8	0.0	0.0	5.3	5.2
	Can—CO_2	8.0	7.6	59	58	0.130	0.128	0.268	0.274	....	....	....	....	5.3	5.2
	Carton	8.0	7.2	60	60	.....	.....	.....	.....	....	....	....	....	5.3	5.2
1 month	Can—air	7.9	..	60	52	0.116*	0.101*	0.294*	0.278*	....	....	....	....	5.3	5.2
	Can—N_2	7.9	..	55	52	0.127*	0.106*	0.297*	0.261*	....	....	....	....	5.1	5.2
	Can—CO_2	7.9	..	48	51	0.119*	0.126*	0.276*	0.288*	....	....	....	....	5.3	5.2
	Carton	7.9	..	61	52	0.107*	0.116*	0.273*	0.277*	....	....	....	....	5.3	5.2
3 months	Can—air	..	7.2	51	54	0.106	.....	0.277	0.277	....	....	....	....	..	..
	Can—N_2	..	7.2	56	54	0.118	.....	.....	0.287	....	....	....	....	..	..
	Can—CO_2	..	7.5	55	54	0.108	.....	0.280	0.280	....	....	....	....	..	..
	Carton	..	7.1	51	52	0.109	.....	0.282	0.290	....	....	....	....	..	..
6 months	Can—air	6.7	7.4	51	53	0.149	.....	0.248	0.268	16.2	18.6	4.5	3.2	5.2	5.1
	Can—N_2	6.7	7.5	53	53	0.168	.....	0.248	0.274	1.4	1.5	3.2	2.7	5.2	5.1
	Can—CO_2	7.1	7.2	52	53	0.118	.....	0.289	0.252	2.0	2.0	91.2	90.6	5.2	5.1
	Carton	6.8	7.0	52	51	0.105	.....	0.260	0.293	....	....	....	....	5.2	5.1
9 months	Can—air	6.5	7.0	54	55	.....	.....	.....	.....	....	....	....	....	..	..
	Can—N_2	6.8	6.8	56	54	.....	.....	.....	.....	....	....	....	....	..	..
	Can—CO_2	6.9	6.8	55	55	.....	.....	.....	.....	....	....	....	....	..	..
	Carton	6.3	6.8	54	55	.....	.....	.....	.....	....	....	....	....	..	..
12 months	Can—air	6.6	6.6	52	57	0.100	0.119	0.298	0.270	16.5	18.1	6.2	6.5	5.1	5.1
	Can—N_2	6.7	6.8	56	56	0.133	0.124	0.292	0.278	1.1	1.6	4.1	4.8	5.1	5.2
	Can—CO_2	6.8	6.9	56	58	0.120	0.122	0.278	0.278	1.9	1.8	94.4	94.6	5.1	5.2
	Carton	6.5	6.3	59	59	0.116	0.112	0.292	0.279	....	....	....	....	5.1	5.2

*Vitamin analyses made on samples stored 2 months instead of 1 month.

TABLE II—Results of Examinations of Dehydrated Beets Stored at 98 Deg. F.

A—Regular moisture content—4.9 percent
B—Lower moisture content—3.7 percent
Peroxidase activity—both A and B—negative

Storage time	Package	Flavor rating		Drained weight (grams)		Vitamin content (mg./100 gm.) Thiamine		Riboflavin		Gas analyses $\%O_2$		$\%CO_2$		pH	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	7.9	7.7	61	59	.....	.....	.....	.....	.....	....	....	....	5.3	5.2
	Can—N_2	8.0	7.7	59	60	.....	.....	.....	.....	1.6	1.8	0.0	0.0	5.3	5.2
	Can—CO_2	8.0	7.6	59	58	0.130	0.128	0.268	0.274	....	....	....	....	5.3	5.2
	Carton	8.0	7.2	60	60	.....	.....	.....	.....	....	....	....	....	5.3	5.2
1 month	Can—air	7.8	6.5	55	54	0.120*	0.116*	0.304*	0.305*	....	....	....	....	5.2	5.2
	Can—N_2	7.9	7.5	56	54	0.124*	0.102*	0.294*	0.304*	....	....	....	....	5.2	5.2
	Can—CO_2	7.9	7.2	56	47	0.150*	0.111*	0.292*	0.306*	....	....	....	....	5.2	5.2
	Carton	7.9	7.1	56	49	0.113*	0.119*	0.297*	0.306*	....	....	....	....	5.2	5.2
3 months	Can—air	7.0	7.0	55	52	0.106	0.110	0.305	0.283	17.1	17.4	8.5	7.8	..	..
	Can—N_2	7.3	7.1	55	51	0.096	0.088	0.279	0.273	1.3	1.1	6.3	7.7	..	..
	Can—CO_2	7.2	6.7	56	52	0.100	0.149	0.265	0.275	1.3	1.2	93.5	93.8	..	..
	Carton	6.9	6.9	56	53	0.120	0.094	0.291	0.271	....	....	....	....	..	..
6 months	Can—air	4.4	5.0	47	49	0.100	.....	0.279	0.300	11.5	14.9	16.6	13.6	4.9	5.0
	Can—N_2	5.2	5.8	48	52	0.100	.....	0.273	0.254	1.1	1.6	10.5	9.7	4.9	5.0
	Can—CO_2	6.0	6.0	45	50	0.112	.....	0.269	0.298	1.3	2.1	93.4	89.8	5.1	5.0
	Carton	5.5	4.8	44	48	0.114	.....	0.282	0.266	....	....	....	....	4.9	5.0
9 months	Can—air	4.9	5.1	41	45	.....	.....	.....	.....	8.1	11.8	20.3	17.7	..	..
	Can—N_2	5.9	5.5	40	44	.....	.....	.....	.....	0.4	1.0	16.5	11.6	..	..
	Can—CO_2	5.9	6.6	41	46	.....	.....	.....	.....	0.9	1.6	92.7	91.6	..	..
	Carton	4.0	5.1	38	45	.....	.....	.....	.....	....	....	....	....	..	..
12 months	Can—air	3.0	5.3	45	53	0.077	0.096	0.276	0.261	4.5	10.4	31.9	19.4	4.5	4.8
	Can—N_2	4.2	6.1	47	54	0.104	0.084	0.267	0.271	0.0	0.8	21.9	14.7	4.5	4.9
	Can—CO_2	4.8	5.4	50	54	0.097	0.083	0.277	0.270	0.4	0.4	95.9	94.2	4.8	4.8
	Carton	2.3	4.2	40	50	0.061	0.079	0.261	0.261	....	....	....	....	4.4	4.6

*Vitamin analyses made on samples stored 2 months instead of 1 month.

changed little. The product stored at 98 deg. F. became slightly darker, while that stored at 130 deg. F. became much darker. The color of the latter, even after reconstitution, was essentially black after three months.

Summary of Results

1. *Effect of Packaging* — The keeping quality of the dehydrated beets was affected only slightly by the different packaging methods employed. There was a definite absorption of moisture by the product packed in the paper containers and stored at 98 deg. F. and 93 percent relative humidity. This absorption was not reflected in loss of quality until the 12-month examination. At the later examinations of the beets stored at 98 deg. F., the gas-packed samples were rated well above the air-packed samples, but by that time, even they were judged below the passable minimum in flavor. The differences in packaging had no appreciable effect on the retention of thiamine and riboflavin.

2. *Effect of Storage Time and Temperature*—Storage at 130 deg. F. quickly lowered the overall quality of the beets. In one month, at this temperature, they had become essentially inedible. They had also become very dark in color and had lost about 40 percent of their ability to absorb water in the reconstitution process. It was interesting to learn that the pH of the cooking liquor dropped from about 5.3 to 4.6 in this time. At 98 deg. F. the beets were on the borderline of passing in flavor after 6 months and close to being inedible after 12 months. There was a gradual loss in color as well as drained weight, the latter being about 25 percent lower after 12 months than the initial. At 75 to 80 deg. F., the product was quite stable. It was given a flavor rating of better than 80 percent of its initial value after 12 months while the drained weight decreased very little in that time. The color also remained about the same.

Large quantities of CO_2 were

(*Turn to page* 122)

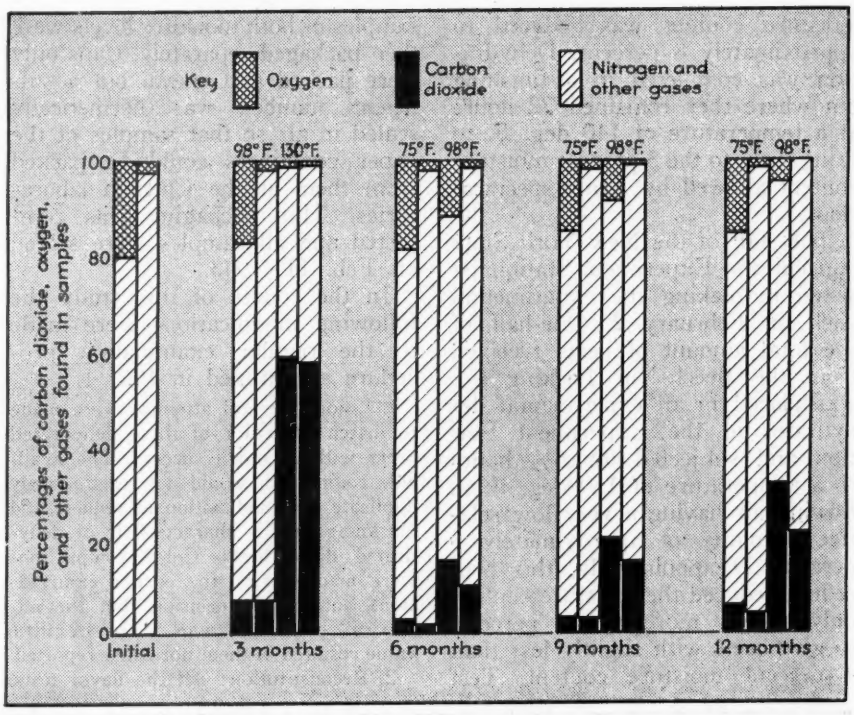


FIG. 4. Effect of storage time and temperature on evolution of CO_2 by dehydrated beets with regular moisture content packed in air and in nitrogen.

TABLE III—Results of Examinations of Dehydrated Beets Stored at 130 Deg. F.

A—Regular moisture content—4.9 percent
B—Lower moisture content—3.7 percent

Peroxidase activity—both A and B—negative

Storage time	Package	Flavor rating		Drained weight (grams)		Vitamin content (mg./100 gm.) Thiamine		Riboflavin		Gas analyses $\%O_2$		$\%CO_2$		pH	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	7.9	7.7	61	59	.....	.....	.....	.....	....	....	....	....	5.3	5.2
	Can—N_2	8.0	7.7	59	60	.....	.....	.....	.....	1.6	1.8	0.0	0.0	5.3	5.2
	Can—CO_2	8.0	7.6	59	58	0.130	0.128	0.268	0.274	....	....	....	....	5.3	5.2
	Carton	8.0	7.2	60	60	.....	.....	.....	.....	....	....	....	....	5.3	5.2
1 month	Can—air	2.5	5.0	37	45	.....	0.057	.....	.....	11.0	....	27.6	....	4.5	4.7
	Can—N_2	3.2	5.0	38	48	.....	0.068	.....	.....	0.1	....	29.8	....	4.5	4.6
	Can—CO_2	4.3	5.0	41	46	.....	0.051	.....	.....	0.2	....	94.8	....	4.6	4.7
	Carton	5.0	5.0	43	48	.....	0.052	.....	.....	....	....	....	....	4.7	4.7
3 months	Can—air	Inedible		..	..	.....	.....	.....	.....	0.2	0.2	59.2	61.1	..	..
	Can—N_2	Inedible		..	..	.....	.....	.....	.....	0.1	0.2	58.3	53.2	..	..
	Can—CO_2	Inedible		..	..	.....	.....	.....	.....	0.3	0.7	96.5	96.5	..	..
	Carton	Inedible		..	..	.....	.....	.....	.....	....	....	....	....	..	..

TABLE IV—Results of Periodic Weighings of Dehydrated Beets Packed in Paper Containers and Stored at 98 Deg. F. and 93 Per Cent Relative Humidity.

A—Regular moisture content—4.9 percent
B—Lower moisture content—3.7 percent

Storage time	Number of samples weighed A	Number of samples weighed B	Average percent increase in product weight over original* A	Average percent increase in product weight over original* B
Initial examination	20	20	....	....
1 month	20	20	0	0
3 months	15	18	0.69	0.62
6 months	12	16	0.83	1.19
9 months	10	14	1.68	2.00
12 months	7	11	2.39	4.07

*These figures are corrected for the weight of water absorbed by the paper in the containers (4 percent increase in container weight in 5 days.)

TABLE V—Results of Periodic Moisture Determinations on Dehydrated Beets.

A—Regular moisture content—4.9 percent
B—Lower moisture content—3.7 percent

Storage time	Storage temperature (deg. F.)	Package	Moisture content (percent of total weight) A	Moisture content (percent of total weight) B
Initial examination	.....	.....	4.9	3.7
1 month	98	Carton	...	4.4
3 months	98	Can—air	4.5	3.4
3 months	98	Carton	5.4	4.4
6 months	98	Can-air	5.2	4.5
6 months	98	Can—N_2	4.9	4.1
6 months	98	Carton	5.5	5.6
6 months	75–80	Can—air	5.0	3.8
6 months	75–80	Can—N_2	4.4	4.6
6 months	75–80	Carton	4.8	4.6
9 months	98	Can—air	5.3	4.3
9 months	98	Can—N_2	5.3	4.1
9 months	98	Carton	6.5	5.6
9 months	75–80	Can—air	4.3	3.6
9 months	75–80	Can—N_2	4.9	4.1
9 months	75–80	Carton	4.2	3.6

How Weather Affects Dehydrator Operation

By JOSEPH B. PARDIECK, Vice-President, California Vegetable Concentrates, Inc., Los Angeles, Calif.

If high temperatures and humidities prevail, there must be compensating changes in equipment and technics. The latter extend from raw material procurement to packaging

EXTERNAL high temperatures and high humidities are not insurmountable obstacles to successful dehydration, but unless the effects are understood, the necessary compensating changes in design and accessory equipment may be omitted unwittingly and cause the loss of considerable sums of money.

At a hypothetical location, assume an average dry-bulb temperature of 95 deg. F. and 90 percent relative humidity. This will be recognized as a hot, humid climate where every physical effort by men results in copious perspiration. In such a location problems arise in storage of raw material, in dryer operation, and in inspection and packaging.

Effect on Raw Materials

If the raw material is a vegetable, unless harvesting, transportation and processing are synchronized perfectly, trouble will begin as soon as the material is held in storage at prevailing temperatures. All leafy vegetables and most root vegetables begin to heat and deteriorate in their containers with loss of color, brightness, flavor and vitamins in a surprisingly short time after harvest. The remedy is to provide adequate cold storage facilities to hold the raw material at temperatures below 50 deg. F. throughout. Vegetables which are held in field crates or big boxes for too long a time before dehydration produce very inferior end products, lacking in naturalness of color, aroma and flavor.

One personal experience with onions shows how important this can be. Matured White Globe onions were spread only 4 in. deep on a dry, wooden floor where the prevailing temperature and humidity were quite high. In less than three weeks these matured, firm onions had deteriorated so badly that decomposition liquids had saturated the floor. Not only was the stored crop a total loss, but to clean out the rotten mess and dry out and fumigate the floor involved much expense.

Effect on Dryer Operation

If three-stage drying is planned, neither the high temperature nor the high humidity would be an important factor in the first and second stages. Air of 90 percent relative humidity at 95 deg. F. drops to 6½ percent relative humidity at about 200 deg. F. If the second stage of drying is conducted with an initial dry-bulb temperature of 165 deg. F., the drying will be done in an atmosphere of about 14 percent relative humidity at the dry end. But if a third stage of drying is used—either tunnel or equalizing bin — conditioned air at the intake is necessary. The conditioning may be done by chemical absorbers followed by cooling. Or the excess moisture may be condensed out by refrigeration, followed by heating of the dried air.

Low-moisture foods can be scorched easily, and if high-humidity outside air is heated hot enough to further dry the product the wet-bulb temperature of the hot air may be high enough to injure the material. The only way to circumvent this problem is to dehydrate the air that is used to dehydrate the vegetable in the last stage.

Effect in Finishing, Inspection and Packing

A dehydrated product will pick up moisture from the air if the atmospheric humidity is higher than the equilibrium point of the product. A product with a 4 percent moisture content exposed to 90 percent relative humidity will regain moisture quickly. The smaller the particles of the dehydrated material, the more rapid is the moisture pickup. If the dry material is fed into a hammer mill operating in a high-humidity room, the moisture pickup is so rapid that the powder will cake even if it is immediately packed in cans and sealed. The remedy is, of course, working in an air conditioned room where the relative humidity is reduced to below 10 percent. This calls not only for air conditioning equip-

(*Turn to page* 122)

USDA Photo by Knell

Spreading blanched, diced carrots on the drying trays. Following this operation, the carrots are dehydrated in a tunnel dryer and then brought to their final moisture content in finishing bins. Multistage drying is a must in high-temperature, high-humidity areas.

keep 'em FIGHTING
Production Wins Wars
SAVE MANPOWER FOR MANPOWER
STOP ACCIDENTS
This Plant has operated over 5 Million man hours without a lost time accident
Production Wins Wars
SAVE MANPOWER FOR MANPOWER

Educational poster and safety equipment display at Los Angeles, Calif., plant of Wilson & Co., calls attention to the plant's world's record.

SAFETY SAVES MANPOWER

Prevention of lost-time accidents means more manhours for production. It also saves the very high direct and hidden costs of mishaps. Some packers are rationing accidents, and others can borrow their methods

By E. V. GILL, National Safety Council, Chicago, Ill.

DURING this period of labor shortage, the problem of accidents has significance beyond the pain and loss of time to the injured individual, inconvenience to the employer's personnel department, and the paying of benefit funds by insurance companies.

Even under peacetime conditions, keeping experienced workers on the job has proved much more effective than obtaining replacements or having a reserve supply of labor on which to draw. For that reason, well-managed companies have developed systematic educational programs to make their employees "safe." They have installed all manner of devices and practices to reduce and eliminate hazards, particularly to production workers.

Accidents cost meat packers $3,000,000 in compensable claims last year. Even more serious was the loss of 1,500,000 manhours of production work through accidental injury. Staggering as these figures are, they still do not give the complete picture. National Safety Council estimates that the hidden cost of each accident averages four times the direct expense involved. Included in the hidden costs are such items as damaged equipment, slowing or temporary halting of production and loss of time by employees other than the injured.

In justice to the meat packing industry, however, its accident record has bright spots. For instance:

1. While the frequency rate is high, the severity rate is less than in many industries reporting fewer disabling accidents.

2. Preventive measures have cut the industry's accident rate almost in half during the last 17 years. In 1926, the frequency rate was about 70. Now it is 35.7.

3. While some plants reported frequency rates as high as 200, the average was brought down to 35.7 by packers with good prevention programs and exceptionally low accident records.

The wartime influx of inexperienced workers put an additional burden of safety training on the shoulders of meat packing executives, supervisors and safety engineers. They had to start from the beginning to impress new employees with the importance of working safely.

In numerous instances the emergency conditions have had a beneficial effect upon management. A positive attitude toward safety is saving large sums of money and making available many more hours of production time. Progressive meat plants now customarily employ a full-time man or staff of men to handle the phase of employee welfare and production activities now generally known as accident prevention. A truly significant factor is found in the adoption of a systematic program.

Safety Suggestions

Safety instruction cards, prepared by the National Safety Council with the help of meat packers,

give detailed instructions as to proper methods in many hazardous operations of meat packing. Recently, a sound slide-film produced by National Safety Council in collaboration with the American Meat Institute has been made available to packers. "Packed with Safety" dramatizes safe working habits to workers. Detailed information on the film, and an accompanying discussion manual and safety quiz, can be obtained from the Film and Slide Bureau, National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill. (Also useful is a mimeographed pamphlet, "The Control of Accidents—Slaughtering and Meat Packing," recently issued by the U. S. Department of Labor, Washington, D. C.—THE EDITORS.

Any food company now having accident troubles will do well to avail itself of the safety measures and devices found in the most progressive plants. While much of the success in cutting down accidents will be found to lie in training employees to work safely, special safeguards must be devised and used for some hazardous tools and materials.

Examples of such operations and methods of dealing with them are found in meat-packing houses. In them a principal hazard has always been the use of knives. A program to cut down the number and severity of knife cuts is now paying extra dividends when every cutter and trimmer is needed for maximum production. Not only are the effective work-hours per week per man increased but production costs per animal slaughtered are reduced.

Accident Prevention Measures

An important part of this program is the issuing of safety equipment without cost to the worker. When safety equipment has to be bought by the employee, even at or below cost, some workers prefer to take the risk rather than make the purchase. When the company supplies the equipment, that element of neglect is removed. Also, the supervisory staff can be more insistent that protective equipment be used. As a result of these advantages, absorbing the cost of safety equipment by the company has been found a good investment. But even where free issuance cannot be practiced, protective equipment should be used.

In general, the devices protective against knife cuts are stainless steel-mesh arm guards, finger guards and gloves for those exposed to cuts on the hand, wrist or forearm. For those who carve or bone large portions of the carcass, there are steel-mesh or other protective aprons. They fit snugly about the worker's body under his white cotton frock. Accident-prevention education and foreman supervision are constantly needed to combat worker indifference or neglect in wearing this protective "armor."

Knife sheaths of metal or plastic are provided to keep the knives covered when not in use and to avoid their being dropped or left in a hazardous manner. Guards are made a part of the knife design to keep the hand of the user from sliding down the knife handle and to reduce the possibility of gripping the knife around the blade. Principally because of the attention knife injuries have received from the packers, knives are no longer the number one accident hazard. The list is now headed by another hazard—falls.

Meat scraps, grease and moisture inevitably find their way to the floor during cutting operations and processing. Such residues cause slippery floors. Complicating the problem is a Bureau of Animal Industry regulation preventing the use of inedible cleansers or abrasives in cleaning the floors. Coarse salt on the floors has been found effective in combating slipperiness and is acceptable to BAI inspectors.

Some meat packers place incorrect handling of objects, or being caught between objects, next to falls as a cause of injuries. Strains from improper lifting are prevalent enough in many meat packing plants

The thumb and first two fingers of operator's hand are protected by a stainless steel-mesh glove. If trimming must be done towards the body, a heavy apron is worn under the frock.

Possibility of falls is cut down by toe plate along the front and chain rail along the back of the platform in the meat canning department.

to make evident the need for additional employee education.

The man who wheels the meat "buggy" from one department to another was formerly one of the most frequent visitors to the first aid room. He would all too often get his hand caught between the buggy handle and a door or other object. Now knuckle guards have been put on buggies.

Other safety devices have played an important part in the past 18 years. Among them are hard hats for men working beneath over-head trolleys, goggles for men exposed to eye injuries, steel-toe safety shoes and numerous guards on the machinery.

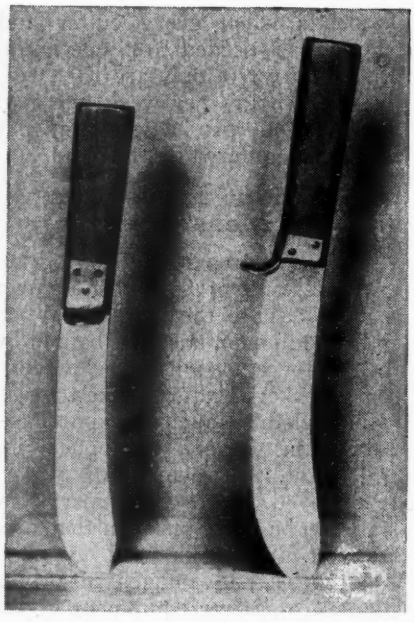
More important in the light of the 1943 record, individual meat packing companies are increasingly organizing for safety. The large packers are setting up sizable departments devoted entirely to safeguarding workers, and smaller companies are installing accident prevention practices.

Wilson's Safety Program

Illustrative of the systematic safety work being done by the larger companies is the program of Wilson & Co., which has a world record for the meat industry of 5,000,000 manhours without a lost-time accident.

This company's safety work is headed by L. O. Green and J. P. Chilson, in the general offices of the company at Chicago, Ill. One specializes in the educational and promotional part of the safety program, the other follows mechanical guarding and other detailed aspects such as the development of safe practices and the correction of unsafe conditions.

These two men are assisted by a general safety committee, consisting of key executives, which formulates the overall program.



Knife handles are fitted with guards that prevent the hand of the user from slipping onto the cutting blade.

In each plant there is a safety man who reports to the general safety department. He, in turn, is assisted by a plant safety committee consisting of plant executives and foremen. The foremen are periodically rotated to obtain maximum participation in the program.

The committee member's job is to assist the foremen in every possible way to prevent accidents in his department. In addition, the committee makes regular safety inspections to determine whether any additional safeguarding of machinery or equipment is needed. The committee also discusses every accident to see what can be done to prevent a recurrence. It studies the accident record to discover causes which may have been overlooked.

Wilson & Co. always has believed that safety is as important a part of the foreman's duties as any of the other supervisory work which he does. For that reason the accident-prevention program of the company is carried out through the line organization. This company is one of the pioneers of safety work in this country, and many unusual safety devices have been developed in its plants. Convinced that the foundation of any successful safety program is the active support and interest of management, the president and other top officials of the company personally follow the safety performances in the various plants.

Recent experiences have taught meat packers that more than mechanical guarding is needed to create safe plants. Safety directors cannot let their responsibility rest with attention to mechanical hazards alone. Education must pave the way for advances in accident prevention in all food industries.

How to make a safe worker is the underlying question in the thinking and planning of every safety director. The successful ones make use of numerous methods and devices. Training courses, posters and bulletins, movies, written material which can be distributed and diligent foreman supervision are all being used to good advantage in many plants. Experience has shown that there just isn't any one way of reaching every individual worker.

Persistence Key to Success

The practice that comes nearest to being an infallible way of making a worker safety conscious is the exercise of persistence; keeping everlastingly at the task of accident prevention, trying every method available to keep the employee interested in his own safety, never letting indifference to safe practices boost the accident rate.

The plants with good records are those which have found persistence in safety matters well worth while. They are the plants which report that financial profits, increase in production and maintenance of high quality standards, together with the humanitarian achievement, far outbalance the extra effort and expense involved in a positive and systematic accident-prevention program. From them come the incentives to equalize the shortage of manpower in food processing plants by making those on the job safe to themselves and to those with whom they are working.

Permanently installed floor plates connecting doorway of receiving dock to doorway of car are hinged so that they can be raised when car is moved but will not slip in use.

Will Home Canning Affect Food Sales?

Housewives have greatly increased home-canning operations in a commendable and important contribution to the wartime food supply. Will their activities continue postwar on a scale that will affect commercial canners? The author explores the possibilities

Molly J. Cox, Flint, Mich., home economist who teaches housewives how to can. She presides at the Home Canning Clinic, held three days a week.

By GIDEON HADARY,*
Chicago, Ill.

COMMERCIAL CANNERS might well give some thought to the effect of war-induced home canning upon peacetime markets. In 1943, the home pack was larger than the civilian allotments of commercially processed foods.

Surveys by American Institute of Public Opinion show that approximately 3,800,000,000 quarts was canned in American homes last year, over 40 percent more than in 1941. The 1943 home pack was equivalent to more than half the 1941 commercial pack, and about two-thirds of the pack was put up by urbanites.

The U. S. Department of Commerce reports that 339,000 pressure cookers, having a retail value of over $4,500,000, were made available to home canners last year. Also, over 560,000,000 new glass jars were used to store the home pack, which required about 800,000 tons of sugar having a retail value of $10,000,000.

The number of home gardens increased from 14,500,000 in 1941 to 20,600,000 in 1943. The situation for 1944 is not fully known. Estimates indicate that as late as May 31 only about 17,500,000 gardens had been planted, with some 2,500,000 more planned for such time as weather conditions would permit.

Of these 17,500,000 gardens, 3,000,000 are in the New England and Middle Atlantic states, 6,000,000 in the North Central states, 6,000,000 in the South, and 2,500,000 in the Mountain and Pacific Coast states.

On the basis of population density, 12,000,000 gardens are in areas with a population of less than 10,000; 3,000,000 in cities with 10,000 to 100,000 people; and 2,500,000 in cities of over 100,000 population.

Even though there is a decrease from 1943 in the number of these urban gardens, the volume of food grown may reach 9,000,000 tons, much of which will be home canned. Approximately one in every four gardeners planned a larger garden for this year, while only one in 13 planned a smaller one. And greater yields are expected this year.

Of the approximate 33,000,000 families which canned the 3,800,000,000 quarts in 1943, only about one-fifth was reported living on farms. The pack per rural family averaged about 220 quarts, compared with a U.S. average of about 115 quarts, and an urban family average of 89 quarts. The urban total was about 2,350,000,000 quarts, or nearly 62 percent of the total 1943 home pack. The average pack per urban family in 1943 was about double that in 1941.

Expansion in home canning has not been limited to urban communities, as may be seen by comparing the 220 quart pack per rural family in 1943 with the 1936 figures in Table I. Farm families in the Pacific region put up only 177 quarts in 1936, and that area led all others.

How much of this home canning will carry over into the postwar period is conjectural. In rural areas a change in the amount of home canning is not as likely to be translatable into effect upon the market for commercial packed foods as is the potential change in the urban areas. Rural families are likely to decrease the extent of home canning and, instead, will probably make more extensive use of locker storage facilities to preserve for out-of-season consumption those foods that have generally been home canned. Urban home canners are not as likely to have locker storage facilities or to be in position to install domestic freezing units in their apartments or landlord-owned residences. Some indications of the possible continuation of urban home canning might be deduced from the data presented in Table II.

TABLE I—Average Quantity Canned by Farm Families in 1936.*

Region	Average quantity quarts
New England	87
Middle Atlantic and North Central	160
Plains and Mountains	127
Pacific	177
Southeast White families	68
Southeast Negro families	39

*Data from Bureau of Home Economics.

TABLE II—Kinds of Foods Canned in Homes During 1943.

Kind of food	Percent of total canned
Vegetables	47
Fruits	38
Fruit butter, jams, jellies and marmalade	13
Fish, meat and poultry	2
	100

*Agricultural Economist, Midwest Regional Office Program Appraisal Branch, War Food Administration. The views presented here are those of the author and not necessarily those of the WFA.

The percentages in this table have been calculated for the 1943 home pack of all U. S. families on the basis of the reports of the American Institute of Public Opinion. The fruit pack was probably overestimated because many families classify the tomato under "fruits". Making allowances for these discrepancies, vegetables have a greater lead than the reported percentages indicate. The predominance of vegetables in home canning is logical because vegetable growing is far more adaptable to home gardens than is fruit growing.

Community canning projects have given considerable impetus to home canning. For example, 23 canning centers in Illinois alone canned over 1,500,000 lb. of food last year. Plans for 1944 call for further expansion in these canning activities.

Having been introduced to home gardening, urban families are likely to continue growing food for home preservation after the war. It may conservatively be estimated that home canning will continue during the postwar period at levels comparable to those of 1941.

Perhaps a detailed consumer study might be undertaken to obtain an indication, if not a complete answer, as to how canners might adjust their operations to the trends in home canning activities. Such a study could show in advance of the commercial canning season what kinds and quantities of foods urban families intend to grow and can at home.

How Bakery Delivers 20,000 Pies a Day

Largest pie baker west of Mississippi uses two-stage delivery to distant points. Puts distribution cost at 20 percent of net sales for driver-owned trucks, 17 percent for company-owned

TO BE profitable, a motor-truck pie route should distribute a minimum of 200 pies a day. This is the experience of Walter B. Bowie, Los Angeles, Calif., pie baker, who started in business 19 years ago with one employee and now is reputed to have the largest exclusively pie-baking establishment west of the Mississippi, with a daily output of from 20,000 to 25,000 pies.

Motorized equipment has played an important part in the growth of this company. From the plant in Los Angeles, daily deliveries are made to the wholesale trade in all important centers in the counties of Ventura, Orange and San Diego and in parts of Santa Barbara, San Bernardino and Riverside counties. Two-stage deliveries reach the most distant points. Heavy-duty trucks carry large loads of pies to distribution points, and ¾-ton panel trucks, carrying from 400 to 700 pies each, make the final deliveries to customers. Although the longest final delivery route is 180 miles, the majority of the routes cover 75 miles a day, round trip.

Some of the trucks are owned by the driver-salesmen. The Bowie company has found that when the truck is the property of the driver-salesman it receives much better care on the road. The result is reduced maintenance expense.

The unit of distribution cost in the pie business is based on a percentage of net sales. It approximates 20 percent on driver-owned trucks and between 16 and 17 percent on company-owned, based on an average daily round-trip operation of 75 miles. The difference of 3 to 4 percent in the distribution cost is represented in greater earnings by the owner-driver.

The driver-salesman cannot purchase his own truck until he has had several years' experience in driving a company-owned truck. He must have demonstrated his ability to retain the sales volume of his route and to so maintain his truck that he may operate at a profit.

The Bowie fleet now consists of 35 trucks, about half of which are driver-owned. The company-owned fleet is standardized on Internationals, and most of the driver-owned vehicles also are of that make.

How Drivers Get Trucks

Bowie salesmen first are employed as relief drivers for a period of three months to a year. No driver is placed on a route until the company feels certain that he can take care of it properly.

The company has no set rule on the sale of its trucks to driver-salesmen. It usually has a piece of equipment which the next qualified driv-

Photo from International Harvester Co.

One of the Walter B. Bowie International pie trucks with the driver-salesman making a delivery at a Los Angeles market. The truck carries from 400 to 700 pies. It is painted red, with black wheels and fenders.

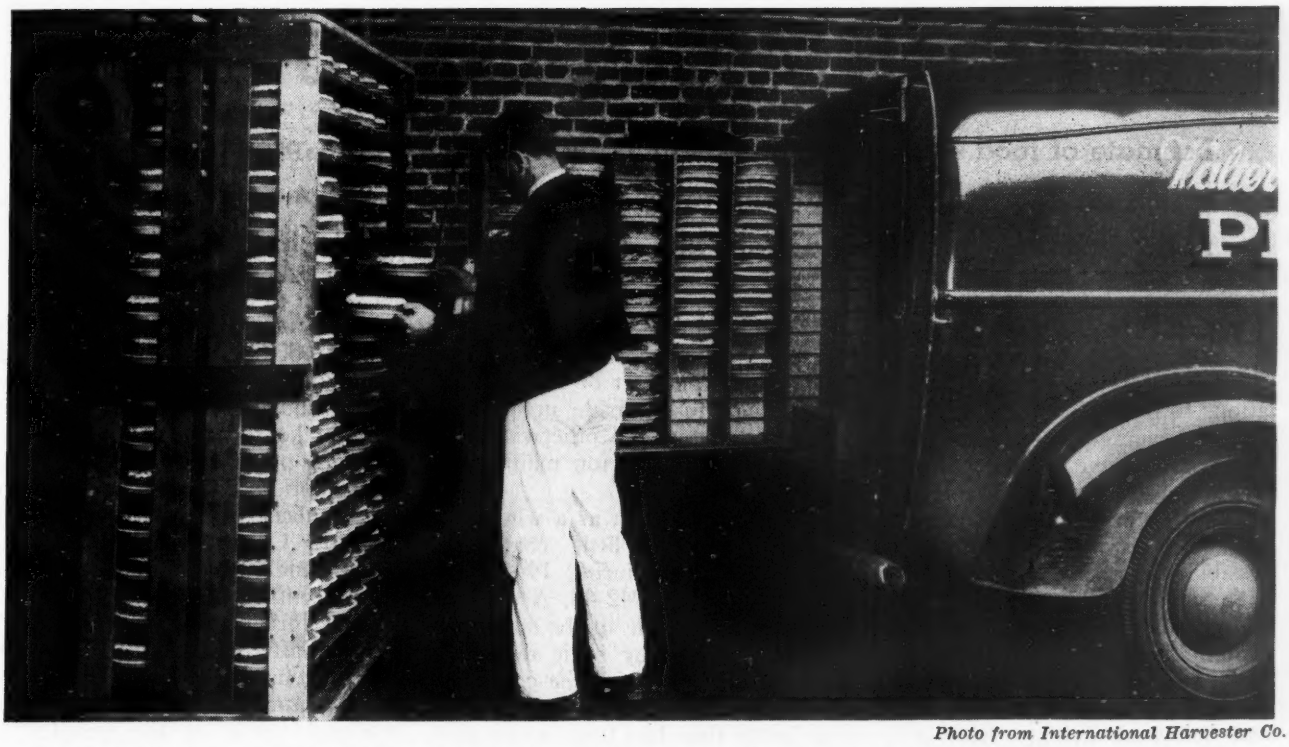


Photo from International Harvester Co.

One of the driver-salesmen of Walter B. Bowie, Los Angeles, Calif., pie baker, loading pies into one of the sliding racks of an International panel truck. To be profitable, a pie-route truck must distribute a minimum of 200 pies a day.

er may purchase if he so desires, although this is not required. If a driver-salesman buys a company-owned truck, he makes a reasonable down payment, the balance being paid in amounts based on the size and earning power of the route. Until the truck is fully paid for, the company retains title to the vehicle. If the driver buys other than a company truck, he is required to make a reasonable down payment and handle the balance in monthly instalments based on his ability to pay. The only company requisites in such a purchase are that the truck be of a make capable of serving the route without unnecessary breakdown and that the body be of such a type that it will carry the required load.

The driver with a company-sold truck has no positive assurance, by contract or otherwise, of employment until he has paid for the truck in full. But the fact that the company sells the driver a vehicle only after he has demonstrated his ability to handle the selected route at a profit constitutes indirect assurance of continued employment.

In connection with driver-owned trucks, the company pays the cost of operating items, including gasoline and oil, tires, repairs and repainting. The painting of all signs also is paid for by Bowie. Both company- and driver-owned trucks are painted and lettered to the same specifications. The bodies are red and the fenders and wheels are black.

The owner-salesmen, or distributors, are required by Bowie to keep the mechanical condition and general appearance of their trucks on a par with the condition and appearance of vehicles owned by the company. They also are encouraged to follow the lead of the company in standardizing on one make of equipment.

There are several fundamental advantages in standardizing. When the size of a fleet is such as to justify the employment of one or more mechanics or greasers, working on a given make and model speeds up their work because they become familiar with the vehicle's mechanical components. Then, too, spare parts for company trucks can be utilized to service driver-owned units. And when major repairs beyond the scope of the Bowie shop are done at the truck manufacturer's service stations, the centralization of such work at one or two points naturally speeds the work. Lastly, when any of the regularly assigned vehicles are withdrawn from service for major repairs or repainting, the substitution of like makes and models facilitates the work of the driver-salesmen.

The dealer or branch service facilities available in the area of delivery also play an important part in helping to keep the fleet in operation for the maximum time over a period of years. Service facilities were the principal factor which led Bowie to standardize on International.

Sliding Racks Save Time

In the operation of the trucks, pies are loaded into four or five vertical racks extending lengthwise of the route-truck's panel body. Access to these racks is through the two-part rear doors of the body. The racks may be slid part way out of the body to permit faster loading of pies onto individual shelves designed to prevent breakage enroute.

After the driver-salesman selects the kinds of pies making up a customer's order, he places them one above the other, eight high, in a metal rack with a handle on the top. One or more of these racks are used to carry the pies into the customer's place of business.

Each of the truck bodies holds from 400 to 700 pies, depending upon the size. The Bowie pies are made in 4-, 8- and 9-in. sizes. The smallest, or 4-in. pies, are turned out by machine at the rate of 7,000 per hour. The larger sizes are made by hand with the aid of an assembly conveyor belt.

Besides speeding the loading operation, the sliding racks facilitate deliveries. Instead of getting inside the body to select the pies for an order, the driver-salesman pulls the various racks part way out and picks out the pies while standing in the street.

EUROPE'S FOOD SUPPLY

Estimate of food supplies on continent is more hopeful than previous reports, although there are critical shortages in some areas. The magnitude of the relief feeding job ahead for the Allies is reflected in this survey

FOOD SUPPLIES in continental Europe are reported by the Office of Foreign Agricultural Relations to be holding to a fairly satisfactory average thus far during the war, despite grave shortages in many areas. A relatively favorable crop of bread grains in 1943, though still below the prewar average, has made possible an increase in bread rations in a number of countries. Feed grains, however, were less plentiful than in 1942, and the current season's supply of grain for the continent as a whole is perhaps 8 percent below an average harvest.

Throughout central Europe, in the low countries and in France, the 1943 potato crop was disappointing, being 20 percent below the prewar average. Potato rations had to be lowered, and this reduction more than offset the increase in breadstuffs. The sugar and fodder beet crops in central Europe are smaller, and sugar beets are being diverted to feed because of the potato and feed grain shortage, so accumulated major stocks of sugar are probably being drawn upon this season.

Vegetable production was affected by the drought in most of the areas except the Netherlands and the Balkans. In these two areas the local supply was up from the preceding year and continued on an export basis. The supply of fresh fruit is down throughout the whole of Europe because of the heavy loss of fruit trees during two severe winters since the war began. Production of fruit improved somewhat in 1943-44 over the preceding year, but is still wholly inadequate.

There appears to be little change in the 1943-44 fat situation over 1942-43. Animal fats are probably lower despite a slight increase in milk production during the summer of 1943. Vegetable fat is somewhat improved because of the larger production of rapeseed in central and western Europe. Production of olive oil in southern Italy and Spain is reported higher. In France, on the other hand, the supply of fats has reached dangerously low levels, if we judge by present rations.

Meat supplies in enemy-occupied Europe remain low. For the first time since the start of the war, inroads had to be made upon cattle reserves that would otherwise have been carried over for maintaining herd numbers.

For the continent as a whole, the report estimates little change in food production during 1943-44 as compared with 1942-43. A net gain may be discernible in the southeast, but it is offset by some deterioration in other parts of the continent. Food consumption has likewise held up better than had been anticipated, although there remains a wide variation among the various countries.

Most of the farm population of Europe continues at close to prewar levels of consumption, as do preferred worker groups in industry and a considerable number of the urban population, who are able to secure food through black markets or through family ties with rural producers. But the average for the continent is estimated at 85 to 90 percent. And there probably are 60,000,000 in Greece, Poland, Belgium, Norway, France, Italy, Spain and Yugoslavia whose average intake of energy foods is less than 75 percent of normal prewar consumption. Perhaps 40,000,000 of these subsist on 60 percent or even less. In Germany proper, on the other hand, consumption is close to 90 percent of the prewar levels.

The foregoing conclusions were reached after careful analysis, country by country, and present reasonably accurate evidence of the nutritional needs of the peoples of Europe in the immediate future. It is, therefore, more than ever necessary to try to gage the outlook for food supplies in the coming European crop season.

The Situation by Areas

In central Europe — Germany, Austria, Czechoslovakia and Poland —a reduction of about 5 percent in overall food production is estimated. In Germany, production was actually

Press Association, Inc.

The French farmer is ready to supply a share of the food necessary to feed the people of the liberated areas, as is illustrated in this scene, taken in Cherbourg shortly after the Allied invasion forces had taken over that important French coast city.

above prewar levels in 1942-43, but the increase was accomplished at the expense of feed crops which ultimately reduced the supply of foodstuffs from animal origin from one-third of the total calories to barely one-fourth. With less fertilizer of all kinds available in the present year and constantly decreasing manpower, the estimated 5 percent reduction for the whole area is regarded as highly conservative.

The liberated areas of Italy were surplus producers of citrus fruit, tomatoes and other fresh vegetables, potatoes, oats, olive oil and nuts, but were deficient in wheat and rice. Production in 1943, however, was considerably reduced due to drought, lack of fertilizer and the menace of military operations. At least until the 1944 crops are harvested, liberated Italy will have to import bread grains, sugar and dairy products. Provincial cities of occupied Italy can obtain main staples only from German stockpiles or from nearby small farms, although an increase in hog numbers is reported.

Belgium will remain one of the most deficient in the European food-consumption picture, despite the fact that some expansion in domestic production has been achieved. Before the war Belgium produced only about one-half its food requirements, and even with German assistance via seed and food imports it barely can maintain a subsistence diet.

The Netherlands, on the other hand, has maintained a relatively satisfactory diet, largely by plowing up pastures to extend plantings of potatoes, grain and oilseeds. The meat ration, however, has been cut nearly 60 percent below the prewar level.

The food situation in Denmark and Sweden appears better than that of a year ago. Denmark has managed to remain within about 11 percent of its high prewar level, and its field-crop production during 1942 and 1943 was higher than before the war. Cattle numbers in Denmark have been recovering from the drastic reduction during the first year of the war, and Sweden is making up the ground lost by the poor harvests of 1940 and 1941.

Norway Below Normal

Norway's situation continues unfavorable, with the present average of consumption estimated to be less than 75 percent of normal. German requisitions of vegetables are heavy, and supplies of meats and fats are scarce. Finland has shown some improvement over the tight situation of a year ago, the new production of grain, potatoes, meat and butter being larger. Only in sugar has the Norwegian allowance been decreased. Potatoes are unrationed.

Food production in the Balkans in 1943, was definitely larger than that of 1942. The improvement resulted largely from the increased production of wheat and rye and brought the food situation in Bulgaria, Hungary, Rumania and Yugoslavia to a more favorable level than the previous year.

Only in the north central surplus area of Greece is the food situation of even the peasant population fairly good. Conditions in the remainder of the country are from fair to critical, despite considerable help from Red Cross food shipments. Albania also continues in critical supply.

Spain's food supply will be no better and may be worse than last year. The output of most staple crops showed a decline as compared with 1942-43, mainly because the areas planted were reduced. Per capita food supplies are estimated at below the average for 1931-35, when Spain virtually was self-sufficient on a low-level diet.

A severe drought greatly curtailed Portugal's output of wheat, rye, corn and barley. For the first time since the outbreak of the war, rations were established for bread, fats, alimentary pastes, potatoes, rice, sugar and codfish. Black - market operations helped to reduce the supply of food going to low-income urban dwellers.

In Switzerland, the food supply is below that of 1942-43 and considerably below the prewar level, even though potato production was about double the prewar average. A shortage of meat was apparent during the spring of 1944.

German requisitions and plundering in the occupied portions of the Soviet Union more than balanced the somewhat larger production in unoccupied Russia. The probability is that the farm population managed to conserve sufficient grain for a reduced consumption and for seeding part of their acreages, while the large potato crop permitted release of some seed for the reoccupied areas. In devastated urban areas, however, distress was acute.

Asparagus Waste Fed to Microbes

Trimmings and culls, disposal of which has been a problem in canneries, are being used experimentally in cultures for bacteria and molds

HERETOFORE a disposal problem for asparagus canners, the butt trimmings and culls, which comprise one-half or more of the gross weight of the asparagus harvest, are now being used in the preparation of a juice concentrate to be used in microbiological industries.

The juice recovery process, originated by the Western Regional Research Laboratory, Albany, Calif., uses a simple flow line composed of essentially four steps. The butts, containing about 90 percent moisture, are first fed into a hammer mill or disintegrator, from which the resultant pulp is pressed in a continuous screw press. The raw press juice is pumped into a holding tank wherein it undergoes a "digestion" treatment to solubilize certain of the nitrogen compounds contained in the suspended solids. This treatment consists of adjusting the pH of the juice to 5 by addition of sulphuric acid and maintaining a temperature of 50 deg. C. for four hours. The digested juice is filtered in a plate-and-frame filter press to remove all insoluble solids. Then the clear juice is pumped into a vacuum pan and concentrated to approximately 70 percent solids.

One of the critical points in the process is the vacuum evaporation, which should be conducted under 28 in. of vacuum or better to avoid caramelization of the simple sugars in the juice and darkening of the product as a result of other undesirable reactions.

Laboratory and commercial trials have shown that the asparagus-juice concentrate can be used in various microbiological culture media.

Freezing Provides an Answer To Sweet Potato Problem

By J. G. WOODROOF and IDA S. ATKINSON,*
The Georgia Experiment Station, Experiment, Ga.†

PART III—The authors conclude this series with an outline of the various uses to be made of frozen sweet potatoes, particularly as an ingredient. Preparation and freezing were discussed in Parts I and II

FROZEN sweet potatoes, sliced or as puree, can be utilized in the same way as unfrozen cooked sweet potato slices or puree. Unless otherwise stated, all of the potatoes used for slices or puree were heated to an internal temperature of 190 deg. F.

Frozen sliced potatoes are satisfactorily candied, fried or made into pies. When thawed and pulped, they may be used as frozen puree in a variety of dishes.

Frozen potato puree may be used in a greater variety of dishes than the slices, and with excellent results. Potato pies, tarts, puffs, soufflè, custard, meat loaf and any other dishes made from unprocessed puree may be made from the frozen product. Flavoring ingredients may be added to the puree before freezing. Properly prepared frozen potato puree does not darken on long standing after thawing or during baking.

Compare Favorably

Pies made from frozen potatoes were identical with those made from cured potatoes, while those from canned potatoes were considerably less desirable, with pies from dehydrated potatoes being rated poorest in color, flavor, aroma and texture. The texture of pies from dehydrated potatoes was coarse and very soft, due to the removal of resins from the potatoes during blanching prior to dehydration. This objection was overcome by mixing with an equal portion of either the cured, canned or frozen product. Dehydrated potatoes alone did not produce the binding properties necessary for proper rising, and the pies were too watery. Pies from canned potatoes were good except for a slight overcooked flavor and a deficiency in yellow color. (See Table IV, Nos. 1, 2, 3.)

Other Comparisons

The frozen sliced potatoes, which were steam blanched before freezing, were thawed at room temperature and pulped before being made into pies. The puree from frozen slices lacked much of the yellow color possessed by the frozen puree. This was due to blanching. The flavor, aroma, and texture of the pies were comparable, as shown in Table IV, Nos. 3 and 4.

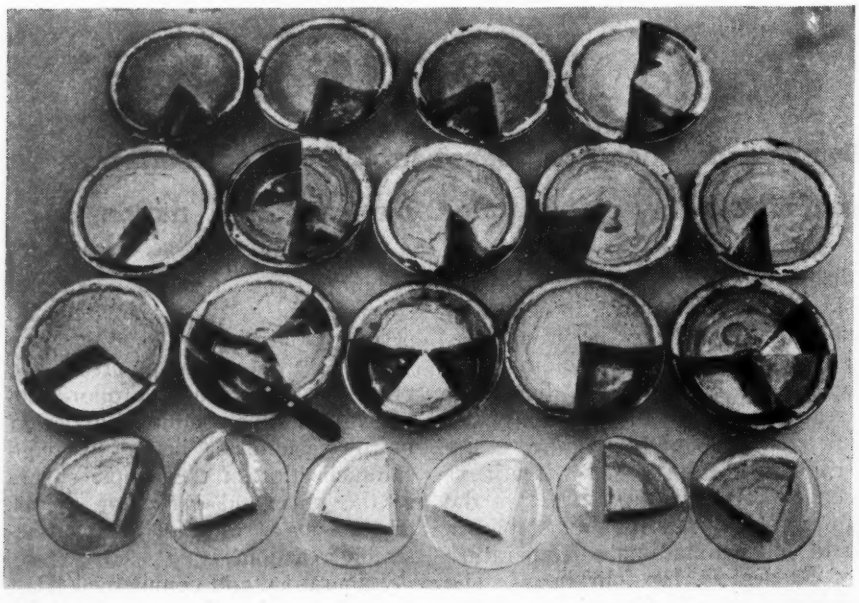
Puree was made from sweet potatoes of all sizes down to 1 in. in diameter, given identical treatment and made into pies. Pies made from very small potatoes (Table IV, No. 6) were equal in color, flavor, aroma and texture to pies made from No. 1 potatoes (No. 3 in table) and from Jumbo potatoes (No. 6).

Pies from potatoes precooked by steaming under pressure were superior in color and flavor to pies from potatoes either boiled or baked: those from baked potatoes lacked intensity of yellow color, while pies from boiled potatoes did not retain as much of their natural flavor, color or aroma. (See Table IV, Nos. 3, 7, 8.)

Puree from potatoes that were precooked to an internal temperature of 175 deg. F. or lower produced pies with a rough texture and which lacked natural flavor. Puree from potatoes cooked to 190 deg. or higher produced pies of excellent qualities. (See Table IV, Nos. 9 and 10.)

Sugar and Citric Acid

Although samples of puree frozen with sugar and increasing amounts of citric acid were on storage for only a short time, certain facts were discovered. Citric acid crystals were



Pies made to determine the qualities of sweet potatoes given different treatments before freezing.

*This project was sponsored jointly by the Georgia Agricultural Experiment Station and the Tennessee Valley Authority. S. R. Cecil made the chemical determinations.

†Paper No. 125, Journal Series, published with the approval of the director.

pulverized and blended with the sugar before being added to the puree for freezing. Confectioners sugar was used for an even blend but was found undesirable because of the thinness it gave the puree. Although citric acid restored the color before freezing, the same change was effected when added after freezing and thawing for use.

Pies were prepared from puree containing 0.2, 0.3 and 0.4 percent citric acid. The smallest quantity was adequate to produce a natural brightness of color, yet it was almost undetectable to taste. Additional quantities caused no further change in color. However, 0.4 percent citric acid gave the best balance of sweetness and acidity and brought out the potato flavor more decidedly, as shown in Table IV, Nos. 11, 12, 13, 14, 15.

The tartness of lemon juice in combination with the citric acid in the juice and with sugar brought out the potato flavor more definitely than just citric acid alone with sugar. Lemon juice also produced a finer and firmer texture as it caused coagulation of the raw egg and consequently a thickening of the potato filling before baking. For this reason, lemon juice was the last ingredient added. The pie filling with citric acid was very thin before baking. The effect on the color of the puree was the same. (Table IV, Nos. 3, 12, 13, 14, 15.)

Pies made with all corn sirup (No. 16) were not sweet enough, but they had very fine textures that were soft and slightly moist. A 3 to 1 ratio of corn sirup and sucrose gave desired sweetness and a fine, firm, moist texture (Table IV, No. 17).

The best quality pies from frozen sweet potatoes were made as follows: Cured sweet potatoes were lye peeled, steamed under pressure, pulped and frozen. When removed from the freezer for use, the puree was allowed to stand at room temperature until thawed.

Formula for Pie

Use 1½ cups of puree, 3 eggs, ½ cup of sugar, 3 tablespoons of corn sirup, ½ teaspoon of salt, ¼ teaspoon of nutmeg, ¾ teaspoon of cinnamon, ¾ cup of milk, ¼ cup of melted butter or margarine and 2 tablespoons of lemon juice.

Beat egg until light; add sugar, corn sirup, salt, nutmeg, cinnamon, milk and butter, and beat until smooth. Add potato puree and beat well. Add lemon juice last. Pour into a pastry-lined pie pan and bake at 450 deg. F. for 15 minutes to brown the sides and bottom of the crust. Then reduce the temperature to 300 deg. F. and bake 20 minutes, or until a knife comes out clean when inserted. Makes one 9-in. pie.

Puree in Ice Cream

Sweet potato puree did not have a sufficiently distinct flavor to use as the principal ingredient in ice cream. However, it did impart a very fine, smooth texture and an attractive yellow color to ice creams with a custard base, when other flavoring ingredients were added.

Ice Cream Formula

Use ½ cup of sweet potato puree, 1 egg yolk, 2 tablespoons of sugar, 2 tablespoons of brown sugar, 1 tablespoon of corn sirup, ⅛ teaspoon of salt, ½ cup of milk, ⅛ teaspoon of cinnamon, 2 tablespoons of orange juice, ½ teaspoon of grated orange rind, ¼ cup of toasted pecans and ½ cup of cream (may omit).

Mix sugar, corn sirup and salt with egg yolk until dissolved. Add milk gradually, mixing thoroughly. Place over medium heat, stirring constantly until thickened, when mixture coats spoon. Remove from heat and cool. Mix cinnamon, orange juice and orange rind with puree and add to custard, then chill. Fold whipped cream into mixture and add pecans, then freeze.

TABLE IV—Comparing the Quality of Pies Made from Fresh, Dehydrated and Frozen Sweet Potatoes.

Number	Treatment*	Appearance	Surface	Yellow**	Red**	Sweetness	Acidity	Flavor	Aroma	Texture
1	Boiled, pulped	Very desirable	Smooth, glossy	6.00	.30	Very desirable	Acid	+++++	+++++	Fine, firm, moist
2	Lye-peeled, sliced, steamed, dehydrated, ground	Slightly desirable	Cracked, dull	2.16	2.00	Moderately desirable	Acid	+	++	Coarse, very soft, very moist
3	Lye-peeled, steamed, pulped, frozen	Very desirable	Cracked, glossy	8.00	3.21	Very desirable	Acid	+++++	+++++	Slightly, fine, firm, moist
4	Lye-peeled, sliced, steamed, frozen	Very desirable	Smooth, glossy	5.50	3.50	Moderately desirable	Acid	+++	+++	Very fine, firm, moist
5	Lye-peeled, steamed, pulped, frozen	Moderately desirable	Cracked, glossy	6.00	3.02	Very desirable	Acid	+++++	+++++	Slightly smooth, firm, moist
6	Lye-peeled, steamed, pulped, frozen,	Very desirable	Smooth, glossy	5.50	4.00	Very desirable	Acid	+++++	+++++	Fine, slightly, soft
7	Baked, peeled, pulped, frozen	Very desirable	Smooth, glossy	5.50	3.51	Moderately desirable	Too acid	++++	+++++	Fine, firm, moist
8	Lye-peeled, boiled, pulped, frozen	Moderately desirable	Porous, glossy	5.10	3.21	Moderately desirable	Too acid	++++	+++++	Very fine, firm, moist
9	Lye-peeled, steamed, pulped cold, frozen	Slightly undesirable	Very porous, dull	6.00	2.90	Moderately desirable	Subacid	++	++++	Slightly coarse, firm, moist
10	Steamed, peeled, pulped hot, frozen	Moderately desirable	Smooth, dull	6.00	2.92	Moderately desirable	Acid	++	++++	Fine, firm, slightly moist
11	Lye-peeled, steamed, pulped, frozen with sugar 4:1	Slightly undesirable	Porous, glossy	5.05	3.00	Moderately desirable	Subacid	+	++	Fine, firm, moist
12	Lye-peeled, steamed, pulped, frozen with sugar 4:1, citric acid .25%	Slightly desirable	Smooth, glossy	5.05	2.52	Moderately desirable	Subacid	++	++++	Fine, firm, moist
13	Steamed, peeled, pulped, frozen with citric acid .25%	Moderately desirable	Porous, dull	7.25	3.20	Moderately desirable	Subacid	++	++++	Slightly coarse, slightly soft, moist
14	Steamed, peeled, pulped, frozen with citric acid .37%	Very desirable	Smooth, dull	7.00	3.42	Moderately desirable	Acid	+++	++++	Slightly coarse, Slightly soft, moist
15	Steamed, peeled, pulped, frozen with citric acid .5%	Moderately desirable	Cracked, dull	7.00	3.02	Very desirable	Acid	++++	++++	Fine, slightly soft, moist
16	Lye-peeled, steamed, pulped, frozen	Very desirable	Cracked, glossy	5.00	2.77	Insufficient***	Subacid	++++	+++	Fine, soft, slightly moist
17	Lye-peeled, steamed, pulped, frozen	Very desirable	Smooth, glossy	6.00	3.30	Very desirable****	Acid	++++	++++	Very fine, firm, moist
18	Trimmings from steamed potatoes, frozen with citric acid .25%	Very desirable	Smooth, glossy	7.00	3.40	Moderately desirable	Acid	+++	+++++	Slightly coarse, firm, slightly dry
19	Trimmings from steamed potatoes, pulped, frozen	Moderately desirable	Cracked, glossy	6.00	2.70	Very desirable	Acid	++++	+++++	Slightly coarse, firm, moist

*Lemon juice (four teaspoons per pound potatoes) was added to all pies to which citric acid was not added when packed.
**Readings made on Luvibonds Tintometer.
***Corn syrup substituted for sucrose.
****One-fourth sucrose substituted with corn syrup.

Temperature Control Saves Can Solder

By D. W. CHOATE and R. R. WEST,
Brown Instrument Co., Philadelphia, Pa.

Evaporated milk packer cut costs $2,500 in year by automatic regulation of temperature in soldering vent holes in cans. Other advantages realized

AUTOMATIC temperature control in the operation of soldering vent holes in condensed and evaporated milk cans cuts costs and protects product quality.

Evaporated milk is packed in preformed cans through a vent hole in the top. After the can has been filled, the hole is closed by a drop of solder applied by a "tipper," or gas-heated soldering iron. Filling and sealing are entirely automatic, at a rate of 170 to 190 cans a minute. Wire solder is fed from reels to the cone-shaped tipper, which rotates continuously and at the same time passes through a reciprocating motion both vertically and laterally. This action allows the tipper to travel a short distance with the can being sealed. The tipper is heated by a gas flame applied at the top of the rotating cone, which conducts the heat to the solder.

When tin was plentiful, the usual practice was to employ a solder consisting of 40 percent tin and 60 percent lead. But it was necessary to reduce the tin content to 20 percent, using 80 percent lead. This change increased the need for automatic control of soldering temperature, because the 20-80 solder has a higher melting point and its plastic range is reduced by approximately two-thirds. The temperature must be maintained within plus or minus 15 or 20 deg. instead of plus or minus 60 deg.

The problem has been met so successfully that at least one large packer plans to continue using 20-80 solder even after all the restrictions on the use of tin have been lifted.

It is important that the solder temperature be kept within close limits. Should it be too cold, the seals are imperfect. If it is too hot, an excess is applied and a pellet may drop into the can, to produce a "reject."

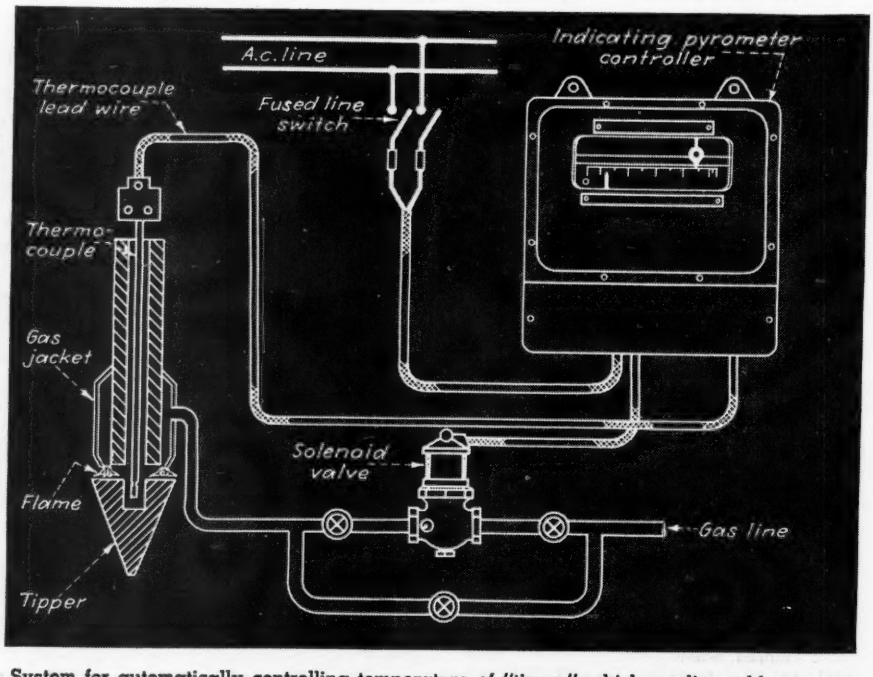
The amount of solder used on a single can may vary from 0.003 to 0.009 oz. When this difference is multiplied by the many millions of cans packed in one year by a single machine, the saving to a packer using automatic temperature control has been as much as $2,500 per year. It has been the experience of the Borden Co. that, when the tipper temperature is automatically controlled and the filling machines in first-class condition, the amount of solder required is reduced by 35 percent. Aside from saving solder and materially reducing, if not eliminating, solder pellets, there have been such other advantages as increased production, freeing the operator from the need of manually adjusting the gas valve, and, in some cases, increased life of the tipper cones.

The temperature control is simple and inexpensive. It includes:

1. A millivoltmeter pyrometer with a 6-in. scale, usually 0-1200 deg. F., to cover the operating range, which varies for individual fillers from 850 deg. to 1050 deg. F. It is calibrated for use with iron-constantan thermocouples. The instrument has a pointer for setting the desired control point and a mercury switch for operation of a solenoid valve in the fuel line.
2. A solenoid valve. The type used with premixed fuels is almost invariably ⅜-in. pipe size and includes a manual bypass, adjusted at the time of installation for minimum fuel flow. This valve is opened or closed to its minimum position by the pyrometer. With natural gas, two valves are generally used, one in the gas and one in the air line.
3. A thermocouple. This is a standard pencil-type unit with a terminal block attached to the machine to prevent it from rotating.
4. An extension lead wire. This connects the pyrometer to the thermocouple in the filler. It is coiled at the filler end to allow for the reciprocating motion of the tipper bracket assembly.

The thermocouple is inserted in the hollow tipper spindle and is attached to the frame or bracket at the terminal block so that the tipper will rotate freely while the couple remains stationary. On machines that have a solid spindle, this part readily can be drilled.

The thermocouple gives an accurate measurement of the tipper cone temperature, and the system controls this temperature by means of the solenoid valve in the gas line operated by the controller.



System for automatically controlling temperature of "tipper" which applies solder to vent hole of condensed or evaporated milk cans on automatic filling machines.

Refining Edible Fats and Oils —Procedures and Problems

By J. DAVIDSOHN and A. DAVIDSOHN, Haifa, Palestine.

Here is a discussion of refining methods, deodorization, factors affecting deterioration, packaging to avoid rancidity, effects of metal and water, and antirancidity agents. It is technology of fundamental importance

TWO problems of outstanding importance arise in the production of edible oils—production of oils free from unpleasant odor and color and avoidance of rancidity during storage. Recent experience shows the close connection between these two problems.

To make clear the connection between refining and subsequent rancidity, it is necessary to show what constituents need to be removed by refining. The principal impurities derived from pressing or extraction of the crude vegetable oil from its raw material are tissue and color constituents and free fatty acids produced within the seeds themselves. In many cases, these free fatty acids result from the effects of mechanical operations and give rise to rancidity. All of them need to be removed by the refining treatment.

Refining unfortunately removes a considerable percentage of the naturally occurring vitamins and phosphatides, which are natural stabilizers and are important for their nutritive values. In some instances, these are destroyed in such a manner as to produce rancid flavor and odor, which can be removed only by intensive deodorization treatment. Deodorization, however, also removes from the oils desirable natural flavor constituents which are indispensable to the maintenance of the character of the edible oil. There are two types of flavor- and odor-producing constituents which must be sharply distinguished: (1) Those flavor and odor substances that are natural ingredients of the oil itself. (2) Those flavor and odor substances that result when the oil is either being obtained by pressing or extracting or when undergoing changes during the development of rancidity.

The composition of the first group is almost unknown. But one can assume that the specific flavor and odor constituents of the different oils and fats are associated with the stearines, lipoids, and the like, of which nearly every natural oil contains a small percentage. Yet this assumption is merely a supposition. (Editor's Note: The authors' viewpoint is based on their own background in Germany and Palestine. It differs materially from United States preferences for bland oils.)

Odor and flavor constituents that are natural to the oils and fats should not be completely removed by the refining treatment. Instead, they should only be diminished in quantity, for on them the specific flavor of the oils depend. In countries such as Italy, Spain and Southern France, where edible oils are freely consumed in the home, the consumption of butter and margarine is much less than in other European countries. Use of butter and margarine in these countries is retarded especially by olive oil and also by ground-nut (peanut) oil and sunflower seed oil. These oils should retain their characteristic flavors in spite of refining. Olive oil is seldom refined.

Fine characteristic flavors can be retained only when the crude oil is obtained from sound fresh seed and is not mistreated during the pressing or extraction operations.

Oils of a lower quality than those mentioned contain to a far higher degree the constituents of the second category. These flavor and odor substances must be removed by harsh treatments during the refining and deodorizing treatments. These treatments also destroy the desirable first group of natural flavors. After passing through all stages of refining, these oils will, very likely, contain no flavor at all. Only in those countries where consumer preference is for a bland or a neutral flavor will these oils receive acceptance.

Unpleasant odor and flavor constituents of the second group are primarily fatty acids which have been liberated during different stages of rancidity development. Usually they are fatty acids, including some fatty acids of low molecular weights as well as oxy- and keto-acids, readily removed by neutralization with caustic alkali. Their removal is necessary before deodorization is begun They result from the decomposition of tissue substances and phosphatides. They and the oxidation products can be removed only partially during neutralization. Complete removal is possible by bleaching and deodorization.

Refining Procedure

Removal of free fatty acids is one of the principal steps in the refining of edible oils. The usual method is treatment with caustic lye, which may be done with either dilute or concentrated solutions of the alkali. We have repeatedly observed that the alkali used is often important. Frequently, in especially difficult cases, the use of potash lye has been more effective than the use of soda lye.

To obtain desired results, the lye solution is sprayed into the oil from spray heads positioned in the kettle above the oil, and the oil is constantly stirred. The temperature of the oil is generally 40 deg. C. during the addition of the caustic, after which it is raised to approximately 60 to 70 deg. C. Test filtrations are made to determine when the desired neutralization point is reached. When the test results are satisfactory, the stirrer is stopped, the soap stock resulting from the reaction between the alkali and free fatty acids settles to the conical bottom of the kettle, and the oil clarifies by sedimentation.

After sedimentation, the clarified oil is drained off into a second kettle identical with the first in which the

soap stock or "foots" is retained. The oil is held at 40 to 50 deg. C. for some time and washed several times with water or 10-deg. Baumé brine. Washed oil needs to be further clarified or filtered to remove traces of undissolved material or finely divided particles of soap stock. Final washing is often followed by vacuum drying. At the drying stage, the oil should be free from all soap stock and almost neutral in reaction.

Soap stock formed in the neutralizing treatment has a certain absorption capacity for color and odor and a certain tissue content which accounts for the bleaching effect of neutralization. Neutralization is that step in refining which may be considered a positive gain. But subsequent processing to remove tissue substances, including treatment with concentrated sulphuric acid and bleaching with Fullers earth or activated carbon, has a destructive effect on the desirable components of the oil previously identified to be of the first group. Treatments after neutralization may be considered to have a negative effect. Not only does concentrated sulphuric acid have a destructive effect upon tissue substances and the phosphatides, it also results in decomposition products which sometimes cannot be removed by subsequent neutralization and bleaching—nor even by deodorization.

Deodorization

An essential step in oil refining is deodorization. Detailed technic based on special equipment is omitted in this discussion. Except in the case of fish oils, deodorization of oils and fats involves treatment of the oil by superheated steam in a high vacuum. In effect, deodorization is a form of steam distillation which removes from the oil those constituents which are volatile under the imposed conditions of high vacuum and temperature.

Depending on the character of the oil, the percentage of volatile odoriferous constituents varies. It even varies in the same kind of oil. Usually the percentage is very low—from 0.1 to 0.5 percent. Salway has found 0.12 percent methyl nonylketone in palm-kernel oil and 0.03 percent in coconut oil. B. H. Thurman (*Industrial and Engineering Chemistry*, vol. 15, 395, 1928) summarizes the losses by deodorization at approximately 0.12 percent in peanut and cottonseed oils and up to 1.75 per cent in beef tallow. These losses do not, however, arise exclusively from the odor-producing constituents. They represent also the loss of other volatiles in the oil.

Compared to the small percentage of odor-producing constituents in the oils, the cost of the steam and energy required for their removal by deodorization is disproportionately high. Therefore, for economy, removal of as much as possible of the odor and flavor constituents during neutralization and filtration is desirable.

Factors Affecting Deterioration

Factors that cause, accelerate, retard or prevent rancidity of fats and oils have been much studied. Research during recent years has been directed towards the effect of light on rancidity, because most of the fats and oils become rancid more quickly when exposed to light, especially ultraviolet. That behavior was reported as long ago as 1890 by Ritsert.

When one realizes that there is a close biological connection between oxidative changes and ultraviolet light—a fact well known to many biologists—the influence of light on rancidity is more easily comprehended. In a practical way the vast amount of research by well-known scientists on this subject may be summarized in the following paragraphs.

The influence of light on oxidative rancidity is not of a primary, but of a secondary nature. For that reason, an oil or fat which is free from substances which could cause rancidity will be more stable against the influence of light than one which contains those substances. Light, especially ultraviolet, is of much greater effect in those months in which the daylight contains the higher percentages of ultraviolet, that is, in the summer time.

Packaging to Avoid Rancidity

When packaging fats and oils, that fact should be taken into consideration, especially when they are likely to be exposed to sunlight. Completely opaque packages or wrappings, such as tin cans, are advantageous. When paper is used, as in the margarine industry, it should be impervious to ultraviolet. Paper of certain yellow, brown, orange and red hues is suitable. Likewise, certain transparent regenerated cellulose films are impervious to ultraviolet. Certain packaging materials of very dark greens and blues are also suitable.

In packaging oils and fats in glass, the same color selections should be observed.

Wrappings of an entirely opaque character, such as paper-backed metal foils, are especially suited for solid fats.

Effect of Metals

Sometimes metals promote rancidity. This damage is, in most cases, not the effect of contamination from metallic containers in which the fat or oil is packed. It is due to traces of metals dispersed in the oil from some prior operation, probably during pressing, extracting or refining. Metals cause and accelerate rancidity in fats and oils.

Effects of Water

Water, too, must be considered, because many of the edible fats and oils on the market contain moisture. Care must be taken to insure that the water used in contact with fats and oils is entirely free from all forms of bacteria. Bacteria in water are especially detrimental to the stability of fats and oils.

In contrast to the deleterious effect of ultraviolet on fats and oils, there is the beneficial effect of ultraviolet on the water used in processing. This is especially true of water used in making butter and margarine. Definite and positive results have been observed by treating the process water with quartz-mercury arcs. Microbial life in the water, which is destroyed by ultraviolet irradiation, would otherwise cause deterioration of the fats, resulting in unpleasant odor and flavor and ultimately making the fat-containing food unmarketable. This problem is best avoided by washing the butter with sterile water, by using refined salt and by working with clean, sterilized equipment. Slightly modified, the foregoing procedure can also be recommended for the margarine industry where rancidity of coconut fat is caused by bacteria and fungi.

Preventive and Retarding Agents

While all the antirancidity agents cannot be discussed here, even briefly, it is important to mention the agents that nearly every natural oil contains. First, are the vitamins, especially A and E, which have antirancidity properties, as previously indicated. In most cases their stability is greater in vegetable oils than in animal fats such as lard. Addition of vegetable oils, having a high content of unsaturated compounds, to

(*Turn to page* 135)

EDITORIALS

LAURENCE V. BURTON, Editor

Housewives Put OK On Dehydration

DEHYDRATORS have new cause to be optimistic about their postwar outlook. Out in Chicago, 450 housewives were questioned by the Bureau of Agricultural Economics to determine their reaction to dehydrated foods. And this survey indicates a promising urban retail consumer market for many dehydrated products. The proportion of the housewives who expressed a willingness to buy various dehydrated foods ranged from 85 percent for cranberries to 55 percent for riced potatoes. In between, in descending order, are eggs, sweet potatoes, beets, milk and carrots. There are, however, some "if's" involved—if proper quality is maintained, if the packages are good and if sound educational promotion and merchandising practices are followed.

Dehydrators ought not to take this favorable consumer reaction as a green light to present methods. In the first place, many a housewife who says she will buy a product, if and when, does not make good with her money an academic expression of intent. Secondly, there is enough room for improvement in the quality of dehydrated foods to justify every effort of the processor in that direction.

Millers Beware

MILLERS producing enriched flour better check up on their quality control. The government is looking into the amount of enriching ingredients in the product, and a test case is expected before long.

So far the Food and Drug Administration has been lenient, letting off those millers who have been "caught up" with the warning that "something must have gone wrong with your enrichment procedure." In some cases the government doesn't really believe that the mistake was accidental.

One "unfortunate" miller, however, was nicked $600 for enrichment below specifications in a sale to the government. The grapevine has it that he tried to economize by having his head miller "cut the enricher down a little" two days after the manufacturer had installed and adjusted it.

As a matter of safety, it would be well for millers to add more than the bare minimum of enriching ingredients to their flour. Enrichment mix manufacturers have agreed to make their product overrich by 10 percent.

There is very little saving in scrimping on enrichment, certainly not enough to compensate for the penalty of condemned product and good-will destroying publicity.

Food Surplus Disposal Presents Problems

IT begins to look as though the policies which will govern postwar disposal of surplus food stocks will be predicated more on the welfare of the farmer than of the food processor. Government officials concerned with the food supply and agriculture production problems want safeguards for farmers and farm commodity prices written into legislation now pending in Congress for the disposal of surplus war property.

In testifying on the Colmer surplus property bill before the House Committee on Expenditures, Ralph W. Olmstead, WFA's Office of Distribution deputy director for supply, advocated continuance into the postwar period of the government's wartime authority to allocate the nation's food supply. Without such authority, he said, the government would be hard put to carry out its price-support commitments to farmers. A significant revelation was made by Mr. Olmstead in his statement that the nation now has four times the normal reserve of foodstuffs—and this level will be maintained for the duration. After the war, the problem is to move this heavy surplus into distribution channels without upsetting the market.

Because of the importance of farm income to our national economy, it will be highly desirable to protect the farmer during disposal of surplus foods after the war. But this should be done in a manner that will not put an economic squeeze on the food processor. Too often in the past has the latter been sandwiched between raw material costs that favor the farmer and finished product prices that suit the consumer. Postwar consumers will have less income. This, together with the depressing effect of surplus disposal, may well mean lower selling prices for the food manufacturer. It is to be hoped that the government will remember that food processing is the nation's No. 1 industry and that its ability to make financial ends meet also is important to national welfare.

Precedent Set in Contract Termination

SOME IDEA of what goes when big war contracts are terminated may be gained from the trail-blazing International Harvester case. This was settled for less than 12 cents on the dollar. Yet the settlement was much higher than is likely in most future cases because the company and its subcontractors had gone to all the expense of tooling and stocking up for the job but hadn't nearly reached full production. Most contracts will be settled after the peak output is passed—at a fraction of the 12 percent figure in the Harvester case.

Commercial Grades For Price Control

PRICE CONTROLS on canned fruits and vegetables "will be based on commercial grades without reference to or use of the United States grades established by the Department of Agriculture." By this announcement on August 7 the OPA bowed to a ruling of Controller General Lindsay C. Warren. The OPA action followed a decision of the Controller General which held that a Congressional rider to the OPA appropriation bill prevented "any and every use" of Department of Agriculture grades in connection with the fixing of price ceilings for processed fruits and vegetables.

Price Administrator Bowles says the ruling will make OPA's enforcement job harder. The industry, he declared, "has a heavy responsibility

to see to it that up-grading does not take place." It would seem that Mr. Bowles is not asking too much, since industry prefers use of commercial grades in price control to government grades. If the industry abuses the situation to the extent that price control is seriously impaired, Congress may take a different viewpoint on government grades.

Prolonging the Life of Tires on Power Trucks

POWER TRUCKS for handling materials are used extensively in food plants. These are equipped with solid rubber tires, the life of which must be extended beyond normal wear so long as rubber is scarce.

Two major causes of excessive wear are contact with oil and grease on the floor and hard smashes on obstructions and the holes in floors and runways. Oil weakens the surface of a rubber tire by changing the rubber compound to a springless, putty-like material which quickly develops holes. Plant managers ought to follow their trucks through factory and warehouse to determine whether the tires are being unduly damaged by grease or hard knocks.

Another cause of excessive truck tire wear is vibration resulting from flat spots or other irregularities on the tire. Such a condition can be corrected by turning the tire in a lathe to make the circumference true with the center of the wheel. The life of the remaining rubber is prolonged by the smooth contour and more uniform distribution of the load.

Tomato Juice Used As a Preservative

RESEARCH in Canada finds that tomato juice helps to preserve non-acid canned vegetables when diluted with water and used as the covering liquid for these products—a new angle on "chemical preservation." The outcome of a search for a suitable acid to make home canning of non-acid vegetables a safer procedure, this development is worthy of note by commercial canners.

In the work done to date, the tomato juice was used in canned peas, asparagus and snap beans. It was found possible to reduce the bacterial population of those packs with a shorter cooking period than when water was used alone. The three vegetables kept well, and their vitamin C content was increased. As to taste, the products were pleasing to those who do not object to a mild tomato flavor.

The tomato juice appears to be effective when used without dilution or in any dilution to half water and half juice. Either canned or fresh juice may be employed.

This method of using a food product to help preserve other foods that require more rigorous processing has enough possibilities to merit consideration. Of course, salt, sugar and vinegar have long been used as preservatives, but the tomato juice technic goes a step further. Certainly, this type of "chemical preservation" ought to meet no objection from the pure food officials.

Fourteen Possibilities For Saving Paper

PAPER remains a critical material. Here are some practical pointers on how to conserve it, supplementing suggestions on page 80 of the August issue of FOOD INDUSTRIES.

In correspondence:

1. Have carbons of replies typed on the backs of letters. This avoids loss of carbons, saves file space and saves paper.
2. Have old letterheads and other stock used on one side padded for scratch pads, memos or interoffice notes.
3. Reduce typing margins; eliminate double-spaced replies.
4. Use a half-size letterhead and small envelopes for short letters.
5. Stop acknowledging acknowledgments—half or more of business correspondence is unnecessary.
6. Be brief—think before you dictate—and save time and paper.
7. Scrap obsolete forms; reduce forms; reduce carbons.
8. Use postcards when they'll do the job.

In office routine:

9. Prune files—scrap obsolete catalogs, booklets bulletins, clippings, old magazines, and what not.
10. Clip wanted material from technical or business magazines and salvage the rest—and the space they will take.
11. Don't crumple or tear up direct mail or used office paper; assemble and salvage it.
12. Suggest or provide containers for used paper, and salvage newspapers, bags, cartons and packing.

In drafting rooms:

13. Ferret out and salvage obsolete catalogs and "dead" files.
14. Salvage spare and obsolete blueprints and specifications.

Postwar Materials— Magnesium, for Example

WARTIME developments will make some entirely new materials available for use in food machinery and packages, and will make some old materials available in quantities and at a price that will greatly extend their possibilities. As a case in point, let's consider magnesium.

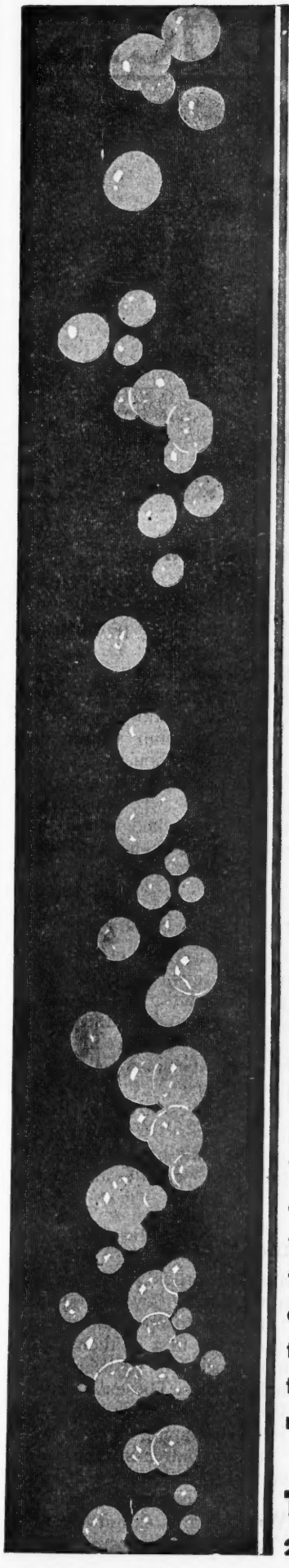
An example of magnesium's use in the food field is in the reciprocating knife frames on bread slicers. This metal reduced the weight of one particular unit from 44 lb. to 13 lb., with a corresponding reduction in bearing loads and vibration.

The most striking quality of magnesium is its lightness. It weighs only 23 percent as much as iron and 64 percent as much as aluminum. In its pure state, however, the metal is relatively weak. But alloying with small amounts of other metals greatly increases its strength. The excellent strength-weight ratios of the alloys give them many structural applications where the temperature does not exceed 400 deg. F.—high temperatures affect the mechanical properties, though not so with subnormal temperatures. Corrosion, too, is a factor to consider. Salt water severely attacks the metal, and precaution must be taken to prevent moisture being trapped in crevices or low spots. Certain alloying elements and protective coatings improve the metal's corrosion resistance.

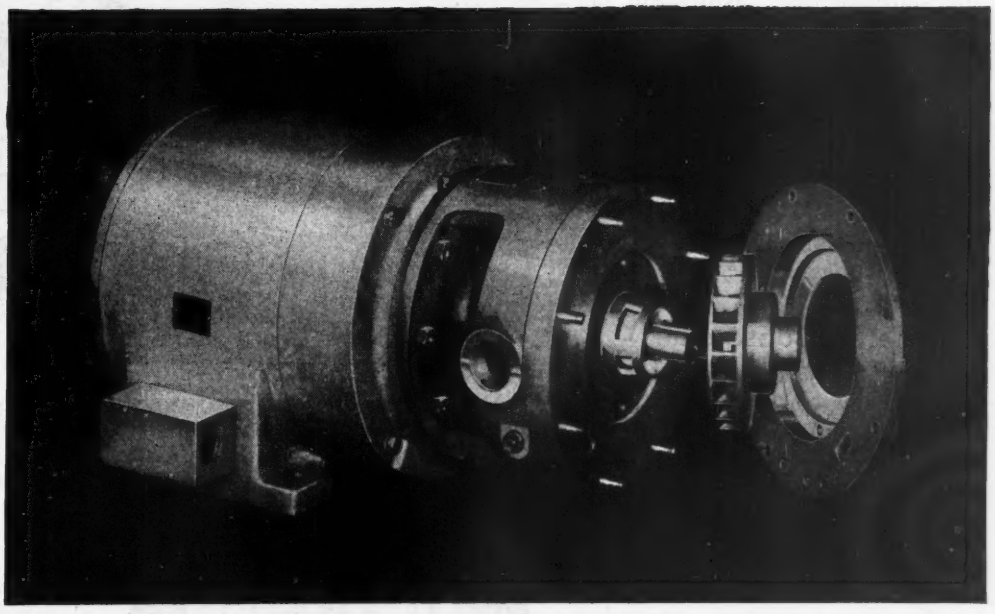
Prior to the war, the nation was producing magnesium at a rate slightly over six million pounds a year. Last year 400 millions pounds was produced, and the figure may exceed 500 million this year.

From $5 a pound in 1935, the ingot price of magnesium fell to 20½ cents on January 1, 1943. On a weight-for-weight basis, the metal is more expensive than the other common commercial metals. But on a price per unit of volume basis, it has an edge over some of its competitors because of its light weight.

The foregoing comment is not presented as a promotion piece for magnesium nor as a treatise on the properties of the metal. But it is given as an example of one of the postwar materials whose possible uses ought to be investigated by technologists and engineers.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS

Biscuit Box

Now being packaged in attractive cardboard cartons instead of in tin are Loose-Wiles Biscuit Co.'s 2½-lb. Sunshine fancy assortment biscuits. The new carton is made of bleached, single, manilla-lined newsboard. The tray which holds the cookies is of greaseproof corrugated parchment and the corrugated dividers are of the same material. So that the cookies may be mailed within the States, as well as overseas, there is an outside corrugated mailing carton of the sleeve type.

Powdered Consomme

JELLIED CONSOMME, in powdered form is being marketed by Dry-Pack Corp., New York, in 2½-oz. consumer-size packages and in 8-oz. bags for the institutional trade. For consumer use, the company has packaged its new product in individual glassine envelopes, each one heat sealed at the top. There are 10 of these in a cardboard box, and 24 boxes are packed to a case. Each envelope contains salt, gelatine, hydrolized vegetable protein derivative, sugar, dehydrated onion and parsley, spices and U. S. certified color. A glassine bag inside of an ordinary brown kraft paper bag holds the larger size, the 8-oz. content of which makes 2 gal.

Dry-Pack's jellied consomme will add flavor to jellied salads or meat loaves. Jellied Madrilene also can be prepared from it by adding ½ cup of tomato juice and water.

New Baking Powder

STANDARD BRANDS, INC., New York, is introducing double-action S.A.S. phosphate baking powder in its Southwestern market on a test basis. The product, which contains no cream of tartar, is replacing Royal cream of tartar baking powder in this market. Sodium aluminum sulphate, starch, bicarbonate of soda and calcium acid phosphate are the ingredients. Royal S.A.S. phosphate baking powder is packed in a 1-lb. fiberboard can with metal top and bottom.

Prepared Fruit Base

A PREPARED mixture containing nine ounces of raisins, citrus fruit peel, sugar, currants, starch, salt, boiled cider, spices and distilled vinegar is packaged in waxed paper and placed in a cardboard box for distribution in the New England, Mideast and Midwest areas by Borden Co., New York. Called Pyco, this sweetened fruit base is used in making pies, cakes, cookies and muffins.

Wip and Freeze

S. B. NIELSEN, Brooklyn, N. Y., is now manufacturing two products that are not new to consumers, but are said to be the first of their kind to contain processed soybean and dehydrated bananas. These are called Crown-Wip and Crown Freeze. The former is for whipping light cream and for making butter stretch, and the latter is for making ice cream. Besides the soybean and bananas, Crown-Wip contains skimmed milk powder, gum arabic, locust bean

gum and gelatine. Crown Freeze is made with locust bean gum, vanillin, lemon powder, dried whole egg, U. S. P. certified egg color, salt, soybean and bananas.

The same kind of container is used to package the two products—a short cylindrical cardboard box containing 2 oz.

Prefers Glass Jars

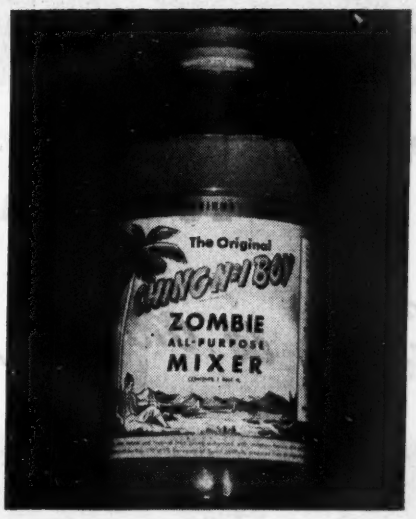
READY consumer acceptance of KC baking powder in glass jars instead of metal cans has led Jacques Manufacturing Co., Chicago, Ill., to pack its product in glass on a much larger scale than before. The company first put its product in glass in 1942, when it found that consumers preferred glass to tin because the amount of baking powder on hand can be seen at a glance without opening the container.

Once opened, the metal screw cap of the jar, which is lined with chipboard and oil paper, gives a tight reseal against air, moisture and loss of strength.

KC baking powder comes in four sizes, 8-, 25- and 50-oz. and 5-lb. containers.

Zombie Mixer

A VERSATILE product is Ching No. 1 Boy Zombie All-purpose mixer, Mr. Mixer Co., Inc.'s, new fruit-juice base. Ching Zombie mixer not only can be used in drinks and punches made with alcoholic beverages but also in sherberts, desserts and toppings. With carbonated water it makes a soft drink. Sugar, water,

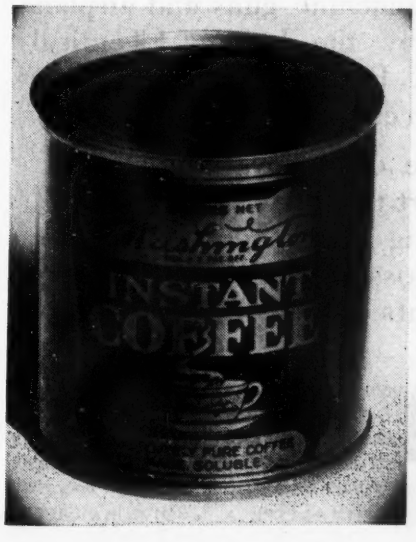


natural fruit juices and imitation tropical flavors, citric acid, U. S. certified color and less than 0.1 percent of benzoate of soda are the ingredients put into the new product. Zombie mixer is put up in 1-pint glass jars with screw caps taped with Celloseal for added protection.

Troop Coffee in Cans

SO THAT men on the battlefront may continue to enjoy good hot coffee, American Can Co., New York, is manufacturing a 4-oz. metal can to replace paper and other containers in which soluble coffee for troops formerly had been packed. The hermetically sealed can assures the arrival of the coffee with the flavor and aroma intact.

There are five large companies packing coffee in these olive drab metal cans on which is lithographed the manufacturer's label. One of the cans is shown here—G. Washington's. The other firms include Henry Heide, Inc., Nestle's Milk Products, Inc., and Borden Co., all in New York, and Forbes Soluble Tea & Coffee Co., St. Louis, Mo.



The CONFUSED FLOUR BEETLE

He's just a simple-minded bug. But he and his close relative, the rust red flour beetle, are about the worst insect pests of prepared cereal foods. They have a taste for other things as well—grocery products, peas, beans, nuts—even mustard and cayenne pepper! Oftentimes they leave a peculiar smell to the flour on which they feed.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well-planned fumigation program.

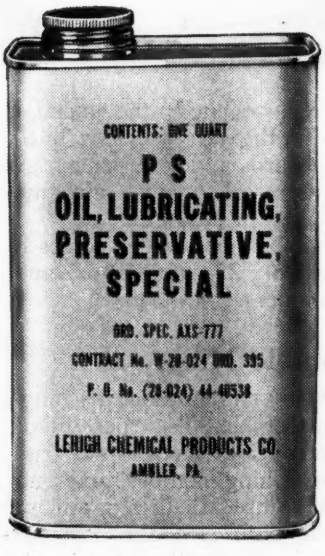
We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.
CYANEGG
REG. U. S. PAT. OFF.
AN ECONOMICAL SOURCE OF HCN FUMIGATING GAS

You can't coddle machine guns or airplanes in the field! Mud and sand . . . rain and snow . . . are the regular routine on the front line . . . and American lives depend on keeping them in action.

Lubricating Oil for machine guns and airplane instruments . . . packed by the Lehigh Chemical Products Co. of Ambler, Pennsylvania . . . travels right up to the battlefront in cans supplied by Crown.

Just one more example of the way in which Crown is bending every effort to provide containers for every need of our fighting men while keeping production on the highest possible level for the essential packaging requirements of the home front!



CROWN CAN

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Md.

FOOD INDUSTRY NEWS

DEVELOPMENTS IN DISTRIBUTION

Grade Labeling Ruled Out When OPA Has Mind Changed

Comptroller-General rules in favor of canners in long standing controversy over use of AMA grades in pricing

OPA lost another round in the grade labeling fight, this time to the canners. The ceiling prices for the first three items of the 1944 pack—spinach, asparagus and red cherries—announced July 31, was based on AMA grades in apparent defiance of the wishes of Congress. A week later the regulation was amended and the AMA grades abandoned completely when Comptroller General Lindsey C. Warren issued an opinion which concluded that "the evidence is impressive that the intention of Congress was to prohibit the use—any use—of AMA grades for the purpose of fixing maximum prices of processed fruits and vegetables." Price controls for all fruits and vegetables of the 1944 pack will be based on commercial grades "without reference to or use of the United States grades established by the Department of Agriculture."

Began in 1942

The recent outburst had its inception in 1942, when OPA announced that the 1943 pack would be based on government grades for which flat dollar-and-cent ceilings would be set. In the ensuing battle Leon Henderson was forced out as Price Administrator and the Taft amendment was passed, protecting brand names and sharply restricting the use of grade labeling.

Just before Congress recessed for the conventions, its opposition to grade labeling was reaffirmed in the second Deficiency bill and in the extension of the Price Control and Stabilization Act (FOOD INDUSTRIES, August, Page 102), and also in the appropriation for the present fiscal year. By these acts, Congress tied its prohibition on the grade labeling and government AMA standards to the use of OPA funds.

In spite of the Congressional ban on the use of AMA standards there was still a kick left in the remnants of the OPA group lawyers and economists who adhered to the belief that the economic system of the country would be improved if brand names could be abolished and all products graded and sold at flat prices which control centered in Washington, preferably with themselves in charge. This became evident when the policy on standards to be used in connection with the establishment of ceiling prices for the 1944 pack of fruits and vegetables was announced on July 24. An attempt was made to explain the use of language in the price regulation that would retain grade labeling under AMA standards and at the same time technically comply with the law.

Submitted to the Comptroller General for his ruling as to whether OPA's action was within the law, the reply came back saying "no" in about 10,000 well-chosen words in which he recited chapter and verse for OPA's benefit. This was followed by an announcement by Chester Bowles that the price controls would be based on the commercial grades, leaving AMA standards out of the picture.

Fight Still On

But the fight is not over. In the statement of considerations involved in the issuance of the amendment to Supplement 7 to Food Products Regulation 1, which defines grades solely in terms as commercially understood, Mr. Bowles says that he "is of the same opinion still." "The provision on grades appearing in the supplement was included for the reasons appearing in the statement of considerations accompanying it. The Administrator believed and still believes that its use is permissible under the second Deficiency Appropriation Act and that it would contribute materially to the enforcement of the regulation."

Again in his statement for the press, Mr. Bowles said, "The more self policing the industry does, the less need there will be for enforcement action by OPA. We propose, however, to use our utmost efforts to secure compliance in the difficult field."

No complete definition of "Grade, as commercially understood," has been made by the OPA. Until there is some clarification on this point, the canning industry will not know where it stands, and neither will OPA.

Food Shipment by Air Given Further Tests

FURTHER tests in the air shipment of foods are being conducted by Transcontinental and Western Airlines, under the direction of Dr. R. W. Hoeker, marketing section head. In these tests, lettuce is being flown from California to Washington under close supervision.

Recording thermometers are used throughout the trip and records are kept of the varying temperatures and altitudes from sea level to 13,000 ft. Special tests are made to designate whether the varying temperature and air pressure encountered affect the nutrient content or appearance of the lettuce in transit.

Other tests will determine what type of planes should be used and whether the cost of such transport will be prohibitive. It is thought that the higher rates of air transportation may be compensated by a reduction in the amount of spoilage, thus reducing overall costs.

BY AIR FROM CALIFORNIA

These nectarines, tomatoes and strawberries were flown from San Francisco to Detroit, as a continuation of the tests described in "Food Industries," July, Page 90. Their outer texture and color are being inspected by (left to right) Earl R. French, national marketing director of A & P's produce affiliate, C. C. Thompson, vice-president in charge of public relations for United Air Lines, and Dr. Spencer A. Larson, Wayne University, director of air cargo research.

Survey Encouraging On Dehydrated Foods

THE first report of the Chicago survey of consumer acceptance of dehydrated foods in the postwar period is encouraging for some items. "It is an initial effort," explain the investigators in their conclusions, "and considerable caution should be exercised in interpreting the results." The survey to date would seem to indicate only that effort to establish acceptance in the domestic market will not necessarily be a waste of time and money. The initial approach seems to be well established by the work so far as well as the prime necessity for quality in the product.

On merchandising the report concludes:

"These results suggest that free samples, instructions on use, and personal contact greatly help to break down initial sales resistance. They also suggest that a focal point for further research is the problem of how to induce consumers initially to buy or to try dehydrated foods.

"The real significance of the results of this investigation is that a large proportion of housewives do not appear to be definitely prejuiced against dehydrated foods, as many thought, and are willing to consider them with competitive foods when making purchases. This suggests that there may be a substantial potential postwar civilian market for many dehydrated foods . . . This study does not furnish a quantitative indication of the size of this potential market."

On the subject of quality the report continues:

"Acceptability of dehydrated foods will be affected by future changes in the quality of dehydrated foods relative to that of competitive products, in the extent of consumer knowledge of the nutritive and other qualities of dehydrated and competitive foods, by possible reductions in the time required for reconstitution, by changes in the types of packages used, by advertising and promotional campaigns, by the developments of new and improved recipes, and by changes in relative prices."

The accompanying chart shows the percentages of housewives expressing a willingness to buy various dehydrated foods.

Swift Plans Training Of Returned Veterans

THE need for training salesmen returning from the armed services so they can cope with postwar sales problems is one of the reasons for the formation of a new Sales Training department announced today by Swift & Co. A. M. Stoeber will head the new department, according to O. E. Jones, vice president in charge of sales and advertising. Stoeber was formerly assistant head of the company's General Plant Sales department.

The new department will direct the training of plant, branch house, and city salesmen for Swift and associated companies. Mr. Stoeber will make use of existing training programs and such new approaches and techniques as will best fit into his program.

Little Change Shown In Subsidy Programs

THE subsidy program for 1944, designed to permit canners to pay support prices to growers of green peas, snap beans, sweet corn and tomatoes, and to pack and distribute these vegetables under civilian price ceilings, will be operated on a processed basis instead of on the raw-product basis used last year.

The program remains practically the same as the 1943 program in all other respects. Provision has been made for the inclusion of pea and tomato soup, but payments in these cases will compensate canners only for the increase in raw material between the area average cost in 1942 and the 1944 support prices to growers.

The support prices for apricots, peaches, pears, fruit cocktail and fruit mix were set at the equivalent of 86.4 percent of canners individual gross f.o.b. civilian ceiling prices or 86.4 percent of area average ceiling prices, whichever is lower.

Increased Production Eases Glass Jar Use

PRODUCTION of glass containers at the highest rate in the history of that industry has resulted in an easing of the restrictions on the use of glass by food packers. Under the new schedule for foods announced in the July revision of the glass container order L-103, most items are permitted unlimited use with only spaghetti and macaroni products, candy and nutmeats, corned beef hash, and sauerkraut being limited to 100 percent of a base period.

When glass containers were standardized, gains were made not only because production of jars and bottles was increased but also because larger sizes were produced. Reports from the glass industry indicate that present rate of production is approximately 127 percent of prewar capacity. Figures for June show it to be 15 percent ahead of June, 1943, and the first six months of this year are 12 percent ahead of the first half of last year. June, 1944, was the best month in the history of the industry up to that time.

It is now apparent that the industry will produce well over 100 million gross this year as promised.

Closures for glass containers are expected to be available for the increased quantity. Aluminum and blackplate rejects are now quota free when used for glass container closures for any product.

British Differ on Dehydrators' Troubles

IN COMMENTING upon the news articles on the dehydrators' difficulties, which appeared in the July issue of FOOD INDUSTRIES, pages 103-4, W. P. N. Edwards, director of information for the British Supply Council in North America, declares that several of the statements do not gibe with the information he has available.

"In the first place," Mr. Edwards points out, "the United Kingdom has accepted all dehydrated vegetables offered within our agreed program and substantially more of certain items." As to the exporting of American equipment in order to establish a dehydrating industry in the British Empire, Mr. Edwards declares that "apart from the supply of certain equipment to New Zealand in 1943, when

ACCEPTANCE OF DEHYDRATED FOODS BY CHICAGO HOUSEWIVES*

Data from survey conducted between April 17 and May 31, 1944

PAPER SALVAGE

The cooperation of the grocers of the nation is being promoted by the distribution of paper saving pledges. Food manufacturers are underwriting the entire printing and distribution costs of more than 400,000 of the pledges, one of which Paul S. Willis, president of the Grocery Manufacturers of America is here showing to Patsy D'Agostino, vice-president of the National Association of Retail Grocers.

a relatively small dehydration industry was established there, primarily to supply the U. S. Army, the only equipment supplied under Lend-Lease to the British Empire has consisted of part of the equipment for two small plants in Kenya and certain items of vegetable preparation machinery for the U. K."

Mr. Edwards further states that it is his understanding that the United Kingdom has never stopped a shipment because of quality. "Shipments of dehydrated vegetables on British account," he says, "have consisted almost entirely of potatoes and carrots." He declares that the U. K. has accepted far more carrots than were included in the original program and in many cases has substituted carrots for other dehydrated vegetables which they would have preferred.

GENERAL

Meat Packing Unions Denied Wage Increase

THE National War Labor Board has received reports from three tri-partite hearing panels in the "big four" meat packing cases. The panels found that, on the basis of the existing wage-stabilization policy, the more than 140,000 employees involved are not entitled to any general wage increase and recommended, accordingly, that the union's demands for general wage increases above the limits of the Little Steel formula be denied.

The panels made no recommendation with respect to the union demand for modification of the Little Steel formula, but stated that should there be a revision of the formula, the employees should obtain the benefits of any such change in the wage stabilization policy.

The Board received reports in three cases:

1. The United Packinghouse Workers of America, CIO, representing 120,000 employees in 21 plants of Armour & Co., 16 plants of Swift & Co., 10 plants of Cudahy Packing Co. and seven plants of Wilson & Co., Inc.

2. The Amalgamated Meat Cutters and Butcher Workmen of North America, AFL, representing 4,300 employees in 7 plants of Swift & Co. and 4,800 employees in 11 plants of Armour & Co.; and the Sausage Makers Union, Local 203 of the Western Federation of Butchers, also AFL, representing 58 employees in plants of Swift & Co., and Armour & Co., in San Francisco, California.

3. International Brotherhood of Swift Employees, independent union, representing 11,600 employees in 10 plants of Swift & Co.

Nutrition Foundation Wins Industry Support

DURING the past two years, the Nutrition Foundation has received $1,500,000 in contributions from 42 food and related manufacturers, according to George A. Sloan, president. From this amount, $530,040 has been appropriated for 87 research grants in the science of nutrition.

In a report on the foundation's research program to date, Dr. Charles Glen King, scientific director, says the research is providing information that supports the contention that during the next decade there will be a rapid and widespread recognition of nutrition as a basic factor in federal, state and municipal public health.

Mr. Sloan also reports that General Mills, Inc., and Zinsmaster Baking Co., have been elected to membership.

Labor Dispute Ends In Western Cannery

A LABOR dispute involving about 70,000 northern California cannery workers was resolved recently by the Tenth Regional War Labor Board when it extended, with important revisions, an existing agreement between the California State Council of Cannery Unions, AFL, and California Processors and Growers, Inc.

Most far-reaching portion of the board's decision, according to the regional chairman, is the action ordering the discontinuance of the "make-up" system of reimbursing piece workers. In place of the system originally designed to give protection to slow workers in piece-work, the WLB has directed a minimum hourly guarantee.

Despite efforts on the part of the union, wartime emergency help will not be required to join the union as a condition of employment, the board ruled. At the same time the employer's request that "victory workers" be exempt from the old contract—required payment of a 50 cent weekly union fee was granted except in the case of those who work beyond two weeks.

SCHEDULE OF EVENTS

SEPTEMBER

10–12—National Poultry, Butter and Egg Association, meeting, Hotel Sherman, Chicago.
11–15—American Chemical Society, 108th annual meeting, Hotel Pennsylvania, New York.
25–27—National Locker Association, convention, Deshler Wallick Hotel, Columbus, Ohio.
26–28—American Meat Institute, 39th annual meeting, Drake Hotel, Chicago.

OCTOBER

3– 5—American Public Health Association, 73rd annual business meeting and 2nd wartime conference, Hotel Pennsylvania, New York.
16–17—Boston Conference on Distribution, Hotel Statler, Boston.
17–18—American Bakers Association, enlarged meeting of board of governors in place of the national conference of members originally scheduled, Morrison Hotel, Chicago.
19–21—National Association of Food Chains, annual convention, Drake Hotel, Chicago.
25–26—Association of Official Agricultural Chemists, meeting, Statler Hotel, Washington, D. C.
25–27—American Oil Chemists Society, 18th annual fall meeting, Hotel La Salle, Chicago.
25–27—American Dietetic Association, 27th annual meeting, Palmer House, Chicago.
26–28—National Coffee Association, annual meeting, Homestead Hotel, Hot Springs, Va.

Has Nutrition Project

ELENA VAHLIS, of Brazil, visited the United States in September in connection with a project for teaching nutrition to European refugee women in her country. Her plan is to have American nutritionists go to Brazil and instruct the refugees, so that they, in turn, may educate the peoples in their native countries when they return after the war. Since many of the European women are prominent in their respective countries, they may be able to raise the nutritional standards and improve the health of the war-ridden peoples. According to the office of the Coordinator of Inter-American Affairs, Madame Vahlis studied with Dr. Josue de Castro, director of Food Technological Institute of Brazil. Nutritionists who may be interested in this project will send their qualifications to Madame Vahlis, at 354 Avenida Atlantica, Rio de Janeiro, Brazil.

ELENA VAHLIS

Agar Is Now Produced In Ample Quantities

THE WAR-DEVELOPED domestic production of agar along with imports from Mexico have so far improved the supply of this important sea-weed extract that restrictions on its use have been removed by WPB order M-96. Formerly, supplies were received exclusively from Japan.

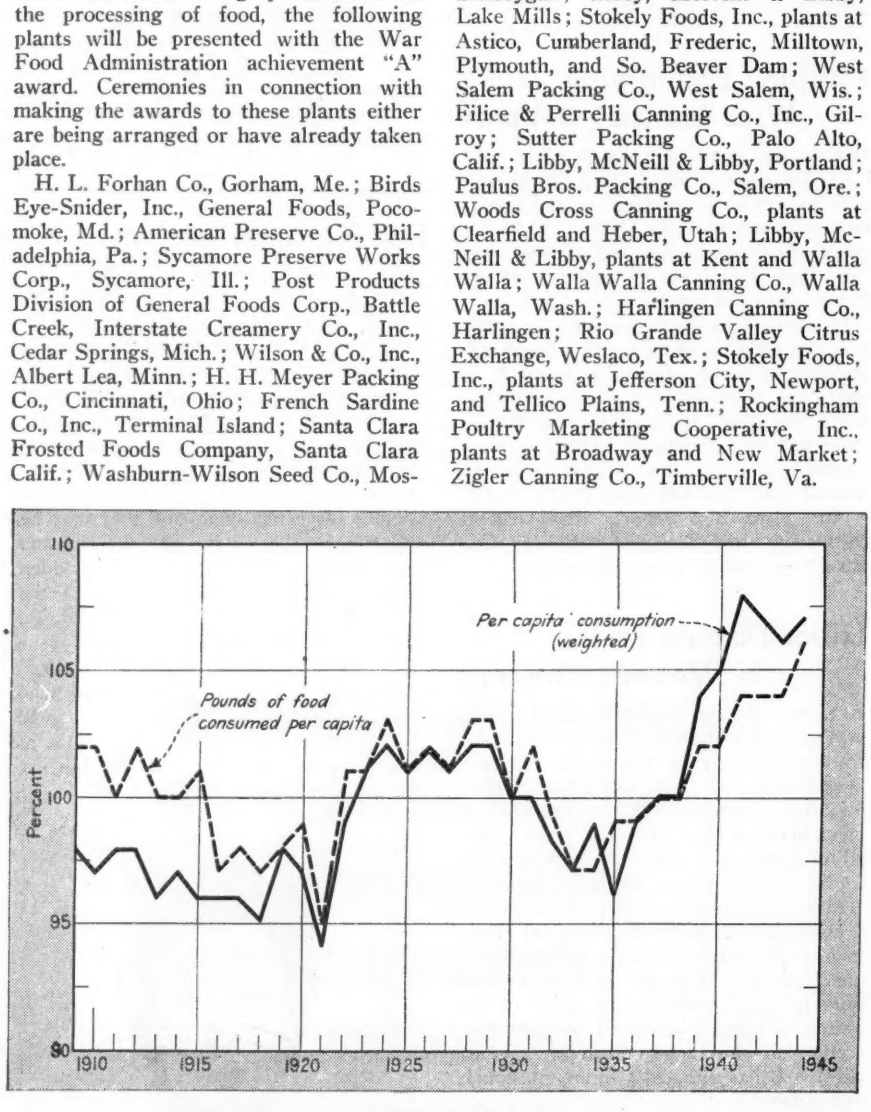
Domestic production of agar was accomplished by close cooperation between industry and the chemicals bureau of WPB. The largest plant, the American Agar and Chemical Co., is situated in Los Angeles. Smaller production units have been established in Massachusetts, Virginia, the Carolinas and Florida.

Additional "A" Awards Given to Processors

CITED for outstanding performance in the processing of food, the following plants will be presented with the War Food Administration achievement "A" award. Ceremonies in connection with making the awards to these plants either are being arranged or have already taken place.

H. L. Forhan Co., Gorham, Me.; Birds Eye-Snider, Inc., General Foods, Pocomoke, Md.; American Preserve Co., Philadelphia, Pa.; Sycamore Preserve Works Corp., Sycamore, Ill.; Post Products Division of General Foods Corp., Battle Creek, Interstate Creamery Co., Inc., Cedar Springs, Mich.; Wilson & Co., Inc., Albert Lea, Minn.; H. H. Meyer Packing Co., Cincinnati, Ohio; French Sardine Co., Inc., Terminal Island; Santa Clara Frosted Foods Company, Santa Clara Calif.; Washburn-Wilson Seed Co., Moscow, Idaho; Nevada Packing Co., Reno, Nev.; Rocky Mountain Packing Corp. plants at Ephriam, Manti, Murry, Ogden and Trementon, Utah; Fisher Flouring Mills Co., Harbor Island, Seattle, Wash.; Ballard & Ballard Co., Louisville, Ky.; The Humko Co., Memphis, Tenn.

J. Richard Phillips, Jr. & Sons, Berlin; The Tilghman Packing Co., Tilghman; S. E. W. Friel, Queenstown, Md., Minot Food Packers, Inc., Bridgeton, N.J.; P. D. Camp & Sons, Cortland; Harold H. Clapp, Inc., Rochester, N.Y.; Parkway Dried Eggs, Chicago, Ill.; Bricelyn Cooperative Canning Assoc., Bricelyn; Stokely Foods, Inc., Lakeland, Minn.; Fredonia Canned Foods, Inc., Fredonia; Fuhremann Canning Co., plants at Appleton and Berlin; Knellsville Pea Canning Co., Port Washington; Lakeside Packing Co., plants at Manitowoc and Sheboygan; Libby, McNeill & Libby, Lake Mills; Stokely Foods, Inc., plants at Astico, Cumberland, Frederic, Milltown, Plymouth, and So. Beaver Dam; West Salem Packing Co., West Salem, Wis.; Filice & Perrelli Canning Co., Inc., Gilroy; Sutter Packing Co., Palo Alto, Calif.; Libby, McNeill & Libby, Portland; Paulus Bros. Packing Co., Salem, Ore.; Woods Cross Canning Co., plants at Clearfield and Heber, Utah; Libby, McNeill & Libby, plants at Kent and Walla Walla; Walla Walla Canning Co., Walla Walla, Wash.; Harlingen Canning Co., Harlingen; Rio Grande Valley Citrus Exchange, Weslaco, Tex.; Stokely Foods, Inc., plants at Jefferson City, Newport, and Tellico Plains, Tenn.; Rockingham Poultry Marketing Cooperative, Inc., plants at Broadway and New Market; Zigler Canning Co., Timberville, Va.



PER CAPITA CONSUMPTION OF FOODS

Although per capita consumption of foods in terms of pounds tends to remain fairly stable, the index of consumption weighted by the average retail prices of foods during the base period 1935-39 shows an upward trend. This fact is accounted for by the shift from cheaper foods, such as potatoes and grain products, to more expensive types, such as dairy products, fruits and vegetables. The nutritional analysis of the national average diet indicates that a general improvement in the nutritive content has accompanied these shifts. If vegetable production in city victory gardens were included, the weighted index would be one point higher in 1943 and 1944, indicating that the per capita consumption this year may equal the all-time record of 1941. (Source, Bureau of Agricultural Economics.)

PROCESSING

Frozen Citrus Juice Is Proved Practical

A PILOT PLANT to improve and refine the findings on the concentration of citrus juices by freezing is being set up by the Agricultural Experiment Station of the University of Florida, at Gainesville, Fla. The plant is being operated in cooperation with the Florida Citrus Commission, and wide-spread adoption of citrus juice concentration by freezing is predicted as one of the results.

The work will be based upon the findings of Prof. Arthur L. Stahl, associate horticulturist. Professor Stahl reports that orange, tangerine and grapefruit juice will keep for two months at ordinary room temperature and for four to six months at low temperatures. After 22 months of storage, Valencia orange juice, concentrated to Brix 48 retained 85 percent of the vitamin C content. There were no changes in acidity, taste or color, and the product could not be distinguished from fresh juice, it is reported.

The concentrated juice can be packaged and stored at 0 deg. F. It can be easily thawed by simply adding a measured amount of tap water, equivalent to that removed from the juice, the whole reconstruction taking but a few seconds. The method can be adapted to all types of citrus juice.

Pea Maturity Test Approved by Court

EFFECT of the decision against the government in the Lord Mott case on the future of the alcohol insoluble solids test and the canned pea standards based on that test is still a question. The case, decided July 18 in favor of the defendent, was a criminal action in which the government charged misbranding. It was claimed that excessive maturity was shown by the percentage of alcohol insoluble solids and that therefore the canned peas in question were substandard.

No counter move will be made by the Food and Drug Administration until the formal written decision has been issued by Judge William C. Coleman who presided at the Baltimore trial. For the present the Administration does not consider the decision binding outside of the Maryland district. Seizures in other districts have been approved and legal action taken where AIS tests show misbranding. However, the use of the alcohol insoluble solids test as the basis for criminal action, in the Maryland district, apparently has been knocked out unless this decision is overturned.

Processing Courses

THE methods of food manufacturer, including the new processes of dehydration, quick freezing, use of microorganisms and packaging are announced as additions to the graduate courses in chemistry and chemical engineering to be offered at the Polytechnic Institute of Brooklyn.

RAW MATERIALS

1944 Food Production To Set New Record

CROP PRODUCTION this year will exceed last year's by 2 or 3 percent and, together with the livestock production, will set an all-time record for the production of agricultural commodities, according to the Department of Agriculture.

Record wheat production of 1,132,105,000 bu. is forecast, compared with a ten-year average of 760,199,000 bu. The output of winter wheat is placed at 786,124,000 bu. against a ten-year average of 570,675,000 bu. The spring wheat crop indicated includes 36,690,900 bu. of durum, compared with a 27,413,000 bu. ten-year average, and 309,291,000 bu. of other spring wheat against a ten-year average of 162,112,000 bu. Canada, too, will produce more wheat this year, having planted 6,400,000 more acres than last year, an increase of 37.8 percent in three provinces representing 95 percent of the country's total wheat area.

Although corn prospects have been affected by drought in the eastern Corn Belt and other areas, production of 2,929,117,000 bu. is forecast, somewhat under the 3,076,159,000 bu. last year but better than the ten-year average of 2,369,384,000 bu.

Estimates for direct food crops included near-record production of rice, dry edible beans, dry peas, fruits, vegetables for processing and truck crops for market, but only moderate crops of potatoes and sweet potatoes. The prospective fruit supply, including both citrus and deciduous, for the 1944-45 season is put at from 10 to 15 percent greater than that produced last season.

Indicated potato production is 385,295,000 bu., less than the 464,656,000-bu. crop last year but more than 362,912,000-bu. ten-year average.

The amount of sugarcane produced for sugar and seed is indicated as 6,166,000 tons, down from 6,510,000 tons last year. Estimated sugar beet output is 7,303,000 tons, up from 6,522,000 tons last year.

Meat production this year is expected to set a record of 25,000,000,000 lb.

With the facts available at present, it is difficult to say whether this excellent crop production will be the boon that it would appear to be. Some authorities say the food surpluses now on hand will cause an economic upset when the time comes to dispose of them. Others hold that they will be taken care of by the new demands of liberated peoples.

More Waxy Starch Promised for 1945

NEXT YEAR there should be grown in the United States sufficient waxy corn to supply all of the special starch required for industrial purposes, the Department of Agriculture forecasts.

The starch from this corn resembles in character the tuber starches, casava or tapioca. A similar result is had with new varieties of sorghum.

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Illustrated here are two of the many types of MOTOCO precision instruments made for specific industrial applications. Left: Combination Thermometer, Pressure and Altitude Gauge. Right: Pressure Gauge used in oxy-acetylene welding.

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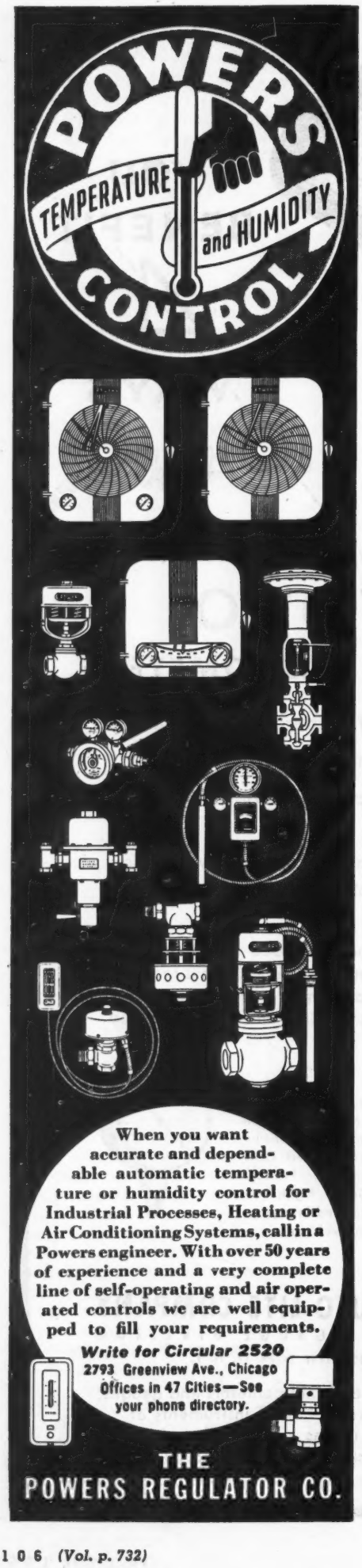
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INDICATORS

Production

Alaska's salmon pack to July 15 this year amounted to 1,434,659 cases, compared to 1,998,740 cases for the corresponding period of 1943.

Meat produced in Federally inspected packing plants, including beef, veal, pork and lamb, totaled 1,353,000,000 lb. in July, according to American Meat Institute. This was the largest July meat production on record with the exception of last year, and only 6 percent less than in July, 1943. Beef output was up 23 percent, veal 97 percent. Lamb production dropped 6 percent; pork, 23 percent.

Canned fish produced for the civilian market is expected to total 365,900,000 lb., 48 percent of the entire output, during the 1944-45 pack year. About 43 percent of the expected supply is salmon and 24 percent pilchards.

Dry milk solids (nonfat) produced during the first six months of 1944 by the spray and roller processes was more than 56,000,000 lb. greater than for the same period of 1943.

Sugar distributed by the primary distributors in the United States amounted to 3,202,626 short tons (raw value) for the first half of 1944. This compares with 2,843,663 tons during the corresponding period of 1943.

Butter, creamery, produced in the first half of 1944 amounted to 814,387,000 lb., 12 percent less than in the corresponding period of 1943 and 10 percent below the ten-year average for the period.

American cheese production totaled 413,802,000 lb. for the first half of the year, 2 percent more than in the January-June period a year ago.

Hawaiian pineapple packed in the 1943-44 season amounted to 10,981,496 cases, and the canned pineapple juice production was 8,229,898 cases.

Fats and oils produced from domestic materials in 1944-45 may total 10,000,000,000 lb., materially less than the record output of 11,400,000,000 lb. in 1943-44. The principal reduction will be in lard, as a 28 percent reduction is expected in the 1944 pig crop.

Frozen vegetable production is expected to be about 20 percent higher this year than last.

Flour milled during July amounted to 13,257,398 sacks, based on figures representing 73 percent of total output, according to *The Northwestern Miller*. This was up slightly over July, 1943, and about the same as in June of this year.

In Storage

Fish and shellfish held in freezing establishments and cold storage houses were at the highest point in history on July 1. Holdings of frozen fish totaled 90,000,000 lb., 50 percent more than on the same date last year.

Wheat stocks (old) in interior mills, elevators and warehouses on July 1 were placed at 29,712,000 bu., lowest for the date since 1937.

Frozen fruits in cold storage increased during June by 15,600,000 lb. to a total of 132,500,000 lb. This is 25,400,000 lb. above holdings on July 1, 1943, and 11,000,000 lb. over the 1939-43 average.

Frozen vegetables in cold storage totaled 115,200,000 lb. on July 1, 41,300,000 lb. heavier than a year earlier and 55,600,000 lb. above average. The net into-storage movement of frozen vegetables during June was 17,300,000 lb.

Meat in cold storage on July 1 totaled 1,105,700,000 lb., which is 402,400,000 lb. heavier than the quantity in cold storage a year earlier.

Lard and rendered pork fats in cold storage on July 1 amounted to 420,900,000 lb., exceeding holdings a year earlier by 200,000,000 lb. and the five-year average by 188,700,000 lb.

Eggs in cold storage were at an all-time high on July 1. Holdings included 11,354,000 cases of shell and 354,900,000 lb. of frozen eggs.

Raw Materials

Fishery products index for landings and receipts (excluding imports) for the first five months of this year was 88 percent of the 1940-42 average for the period.

Milk production for the third and fourth quarters of this year may equal that of

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Director of Circulation:
Please change my address on "Food Industries"

From .....

.....

To .....

.....

Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded August (thousands)	Total Awarded 1944 (thousands)
Bakery	$ 208	....	$ 220
Beverages	325	$ 40	80
Canning and Preserving	75	200	360
Cold Storage	532	....	1,312
Confectionery	40	....	50
Grain Mill Products	80	....	730
Ice Manufactured	....	....	40
Meats and Meat Products	....	....	660
Milk Products	417	198	1,504
Miscellaneous	180	40	1,394
	$1,857	$478	$6,350

the same periods in 1943, but increased noncivilian requirements will reduce the quantity available to civilians.

Fats and oils for civilian use are expected to be relatively plentiful until October, as they have been during the spring and summer, but smaller supplies are forecast for the last quarter of the year.

Cranberry production this year is estimated at 53,000,000 lb., which is about 16,000,000 lb. short of the 1943 crop. About one-third will be taken by the armed forces.

California's grape crop this year is estimated at 2,423,000 tons, or 366,000 under the 1943 crop.

Tomatoes for processing this year will total 3,209,100 tons, an all-time record, according to an estimate based on August 1 conditions. This would exceed 1943 production by 21 percent and the 1933-42 average by 60 percent.

Snap beans grown for processing will total 258,000 tons this year, based on August 1 conditions. This is only about 1 percent less than the record 1943 output of snap beans and over twice the 10-year average production.

Sweet corn production this year, for processing, was estimated on August 1 at 1,221,200 tons, 5 percent above the 1943 output and 52 percent over the 1933-42 average.

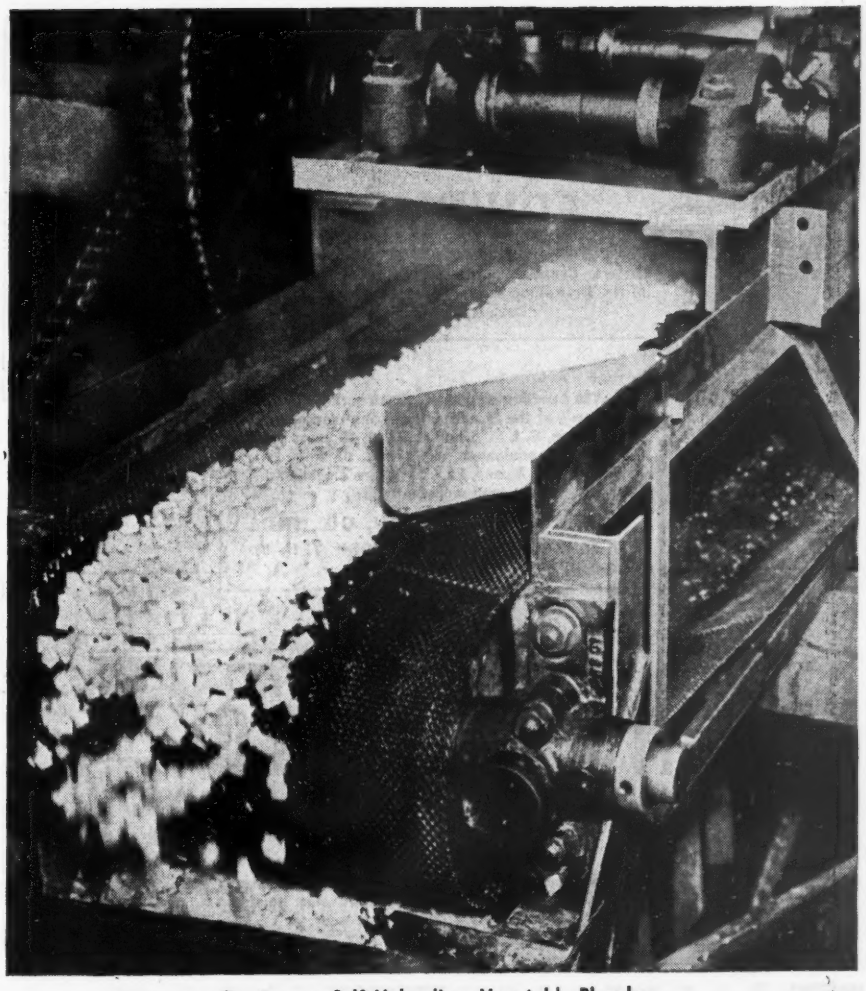
Citrus fruits produced in the United States in the crop year ending in May exceeded 7,000,000 tons, being 12 percent larger than in the previous year and 75 percent greater than the 10-year average.

Indexes

Business activity index of *Business Week* stood at 235.1 on August 12, compared with 235.0 a month earlier and the 237.9 a year ago.

Cost of living index of National Industrial Conference Board was 105.0 in July as compared with 104.4 in June, and 103.1 a year ago.

Wholesale commodity price index for foods, compiled by Irving Fisher, stood at 120.4 on August 25, compared with 121.6 on July 21 and 118.3 on August 27, 1943.



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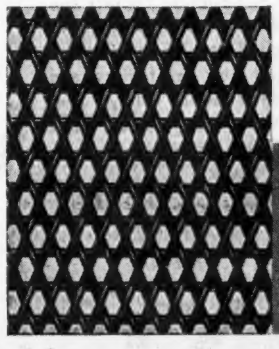

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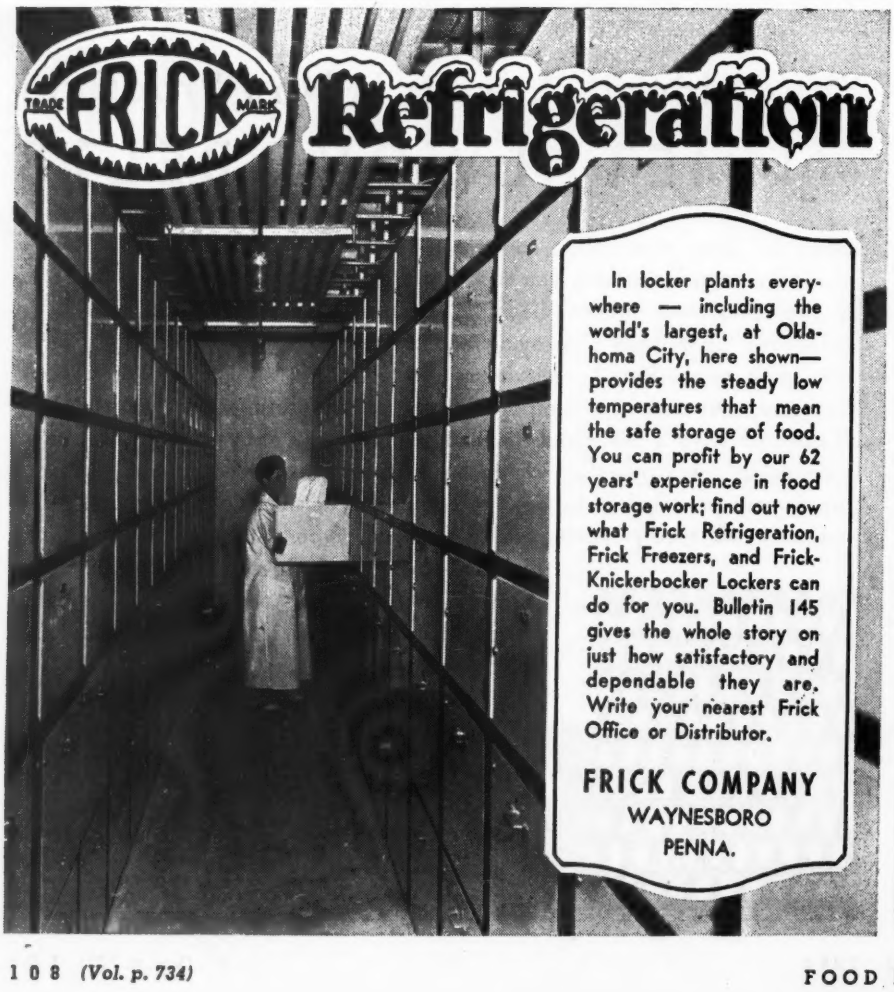
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OPA Price Regulations

Bakery Products — Bakery products, which had been covered by three pricing regulations, were placed under MPR 495, effective August 15. This regulation will cover the bakery products that were under MPRs 262 and 495 and Rev. Supp. Regulation 14. All the pricing provisions are continued in the new regulation.

Fresh Fruits—Amendment 11 to MPR 409, effective August 16, places a definite limitation on charges that may be made for custom packing of fruits and berries. The action is taken as a step toward assuring processors of necessary supplies for freezing and as a means of holding down prices. In no case may the charge exceed the difference between the custom packer's maximum price for sales of the frozen product and either (1) the maximum price established for the particular fruit or berry in MPR 425 or (2) the prices recommended by the Department of Agriculture for payment to growers.

Barrels—Large multiple-outlet operators, such as bakeries and chain grocery stores, who sell tight barrels that have accumulated in warehouses, are placed in a separate class of sellers by Amendment 2 to MPR 524, effective August 17.

Mayonnaise—Manufacturers or processors of mayonnaise and salad dressing may apply to the regional OPA office for an adjustment of prices if their maximum price is below the general level of prices prevailing for similar products in the same area. Amendment 29 to Supp. Reg. 15 also requires that the manufacturer show that he will be unable to maintain his production at his present maximum prices.

Canned Meat — RMPR 156, effective August 4, incorporates the original canned meat regulation, and its amendments, into one document. The revised regulation also establishes flat wholesale prices in place of the "freeze" prices for several semi-sterile canned pork products. The prices of all canned meats are reduced by approximately 10 percent of the cost of the meat raw material.

Soups—Allowances of meats, butter, margarine, fats, oils and sugar, on the basis of amounts actually needed to increase the output of canned and bottled soups now under rationing, are permitted by Amendment 14 to RRO 16 and Amendment 33 to RRO 3, both effective July 22. These allowances are made in order to increase production of soups and may not be used to increase the amount of the ingredients contained in the soups.

Shell Eggs—Pending complete revision of MPR 333, new maximum prices for wholesale grades of shell eggs, ranging from 37.5 to 50.5 cents per dozen, are established by Amendment 27. The prices are based upon grades and are set for each week from July 31 to September 30.

Milk—Farmers' cooperatives are under maximum price control whether or not they take title to the milk of their patrons, according to Amendment 19 to MPR 329. The action, effective July 17, applies only to cooperatives that were exempt from price control as producers under Amendment 13 to the same MPR.

Horseradish—Price controls of from 9 to 9½ cents per pound, plus an incentive increase to producers, are extended to horseradish roots by Amendment 8 to MPR 425, effective July 17. It is thought that this control will protect processors of this seasonal vegetable who were being severely squeezed by rapid increases in the price of the root.

Chicory—An increase of slightly more than 3 cents per pound in the ceiling price of roasted chicory sold in bulk is set by Amendment 154 to Rev. Supp. Reg. 14, effective July 18. Coffee roasters are not permitted to pass this increase along.

Sausage—All sausage items are now placed under MPR 389, effective August 19. This order regulates the ceiling prices to wholesalers and no longer necessitates the inclusion of sausage products under MPR 169.

WPB Orders

Paper Containers—Sanitary paper containers for milk and other foods are placed under WPB by an amendment to M-241, which assures the equitable distribution of the available supply of paper and paperboard to the converters. Pulp has been allocated on the basis of the maximum production for the last quarter of 1943.

Dehydrated Packaging—The entire production of moisture-vapor barrier materials approved for dehydrated packaging is restricted for Army and Navy use by M-380.

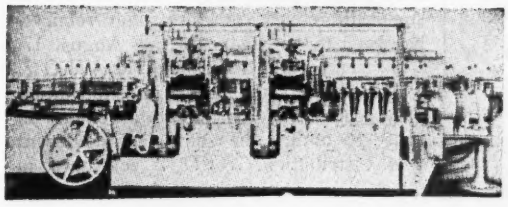
WFA ORDERS

Onions—Restrictions on the sale of dehydrated onions are removed by WFO 30.2, effective July 17, which reduces to zero the percentage which dehydrators are required to set aside for government and essential civilian needs.

Coffee—Soluble coffee manufacturers are instructed to set aside all current inventories and 100 percent of future production of soluble coffee for government needs by WFO 109, effective August 1.

Raisins and currants—Growers support prices for bleached and dehydrated raisins and Zante currants will range from $200 per ton for soda bleached choice Thompson Seedless raisins to $252 for Valencia type Muscat. Zante currants will be supported at $240 per ton.

By an amendment to WFO 17, effective July 17, restrictions on this year's raisin and Zante currant crop in eight California counties will be the same as those imposed during the 1943-44 season.



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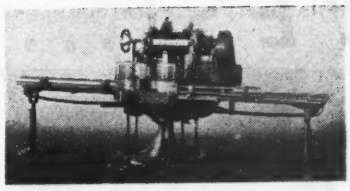

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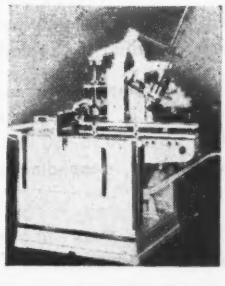

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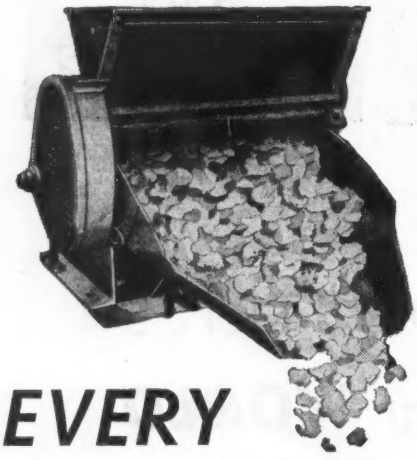

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Sugar—WFO 7.1, which established raw sugar allotments for cane sugar refiners, has been terminated, effective August 17. This termination does not affect WFO 7, which restricts the purchase, importation or acceptance of raw sugar to refiners in order to assure the continued movement into distribution. WFO 7 continues in effect.

Potatoes—Deliveries of potatoes in bags of uniform appearance, which have been thoroughly cleaned, mended and turned, may be made at the same prices as those delivered in new bags. The deduction of 10 cents per hundredweight for deliveries in all other bags is continued by this amendment to the 1944 price support program for Irish potatoes.

Grapes—WFO 80 restricting the sale of Concord type grapes for fresh consumption has been terminated. The total grape production in the five major areas is estimated at 164,800 tons as compared with 129,800 tons produced in 1943. This increase is sufficient to assure the manufacturers of jams, jellies and fruit butters of ample supplies.

Ice Cream—Amendment 4 to WFO 8 releases manufacturers of frozen dairy foods from the restrictions in the use of milk solids-not-fat in ice cream so long as the total quantity used does not exceed 22 percent. Previously, this use was restricted to 80 percent of the butterfat used. The amendment also specifies that those subject to WFO 8 shall maintain records of production and transactions for at least two years.

Rice—An amendment to WFO 10 reduces to 35 percent the quantity of their milled production that must be set aside by the Nation's rice millers after October 1. This is 10 percent less than the set-aside requirements of the previous crop and 25 percent below the original order, issued Jan. 21, 1943.

Cottonseed—The minimum support price for cottonseed established for the 1943 crop will be extended to cover the 1944 crop. This support price is $55 per ton f.o.b. shipping points in Oklahoma, Texas and New Mexico and $56 per ton at all other shipping points.

Beef—Federally inspected slaughterers are required to increase from 35 to 45 percent set-asides of beef, meeting Army specifications. This is required by Amendment 11 to WFO 75.2, effective July 30.

CAPITAL VIEWS

NOW UNLIMITED—"The use of glass containers for the packing of most foods, drugs and health supplies (formerly under quota) in most instances is now unlimited." This was an official statement of WPB on July 18. It represented a much needed release of glass containers because pulp and paper containers are now extremely scarce. Within a week of the statement about abundant glass supplies there was a ruling that even milk containers of paper had to be restricted by rigid quotas and rationing. Until the German collapse is complete and shipment of goods to Europe tapers off greatly we can expect a shortage of all paper materials.

PROFIT YARDSTICK—The OPA is finally recognizing that the overall profit of an enterprise is really important. They have ruled specifically that a manufacturer of products from the wet milling of corn may seek higher ceiling prices for his output in order to cover full costs if the present profit level is less than that of the base period 1936 to 1939. If this general principle is really applied fairly we can almost believe that OPA has been converted to an intelligent constructive industry-guiding agency.

RATION POINT INDEX—The extent to which fresh vegetables can be supplied is now to determine the ration point rate at which canned vegetables will be granted to the housewife and institutional user of canned food. This statement of OPA is intended to show that canceling of point-free merchandising represents a return to market controls on the old theory. Apparently OPA is anxious that the general public,

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as well as the food technologists, know that point-free sales are going to be granted only when there is a glut for some particular commodity. We can hope that facts and intelligent interpretation will be used in applying this rule.

TRUCK EFFICIENCY — Delivery trucks in the baking industry hauled 26.5 greater percentage of baked goods in 1943 than in 1941. They did this while traveling 1,252 million miles in contrast with 1,715 million miles traveled in 1941. Thus the industry by closer schedules and more careful handling of deliveries increased the haulage efficiency by 73 percent, measured in average pounds delivered per mile of truck travel. That is a remarkable and splendid record. It remains to be seen how much of this economy and efficiency can be retained in the postwar period when competition will encourage even "excessive" service to retailer-customers.

PROFITABLE RECLAIMING—Many food merchandising establishments are finding it very profitable to arrange for reclaiming of food containers, especially such things as tight barrels. Food manufacturers are finding it equally profitable to encourage this practice among their customers. It gives a greater supply of containers for reuse, very essential these days. In a few cases there is urgent need for an additional part to this business. Secondhand container dealers are needed to collect and put into good usable condition the returned containers. This is not necessary, nor is it desirable, for containers which can properly be reused only by the trademarked goods which they first carried when new. But there are other types where the secondhand dealer is an important, or even essential, factor in getting back to the factory a maximum supply of reusable containers. The packaging and transportation divisions of food factories will have to figure out for their own circumstances which is the best plan.

LESS MILK—The supply of milk for the fluid milk and cream market, as well as for all milk products, is going to be less for the next six months or year than in any time past. Anyone who can get along with less milk for his product had better plan to do so. He had better plan to do so whether he wants to or not.

SURPLUS FOOD—There are two schools of thought in Washington about postwar surplus food stocks. Both know that the United States directly owns or controls tremendous stocks of various kinds of processed foods. One says that this is going to be dumped on the market and thus ruin producers and distributors. The other says that all this food will go into UNRRA, Lend-Lease or other government-controlled distribution. Both extremes are probably wrong. There will be some surpluses for domestic disposal. But the Surplus War Property Administration is definitely planning to use commercial distributors and to handle goods in such a way as not to break markets anywhere.

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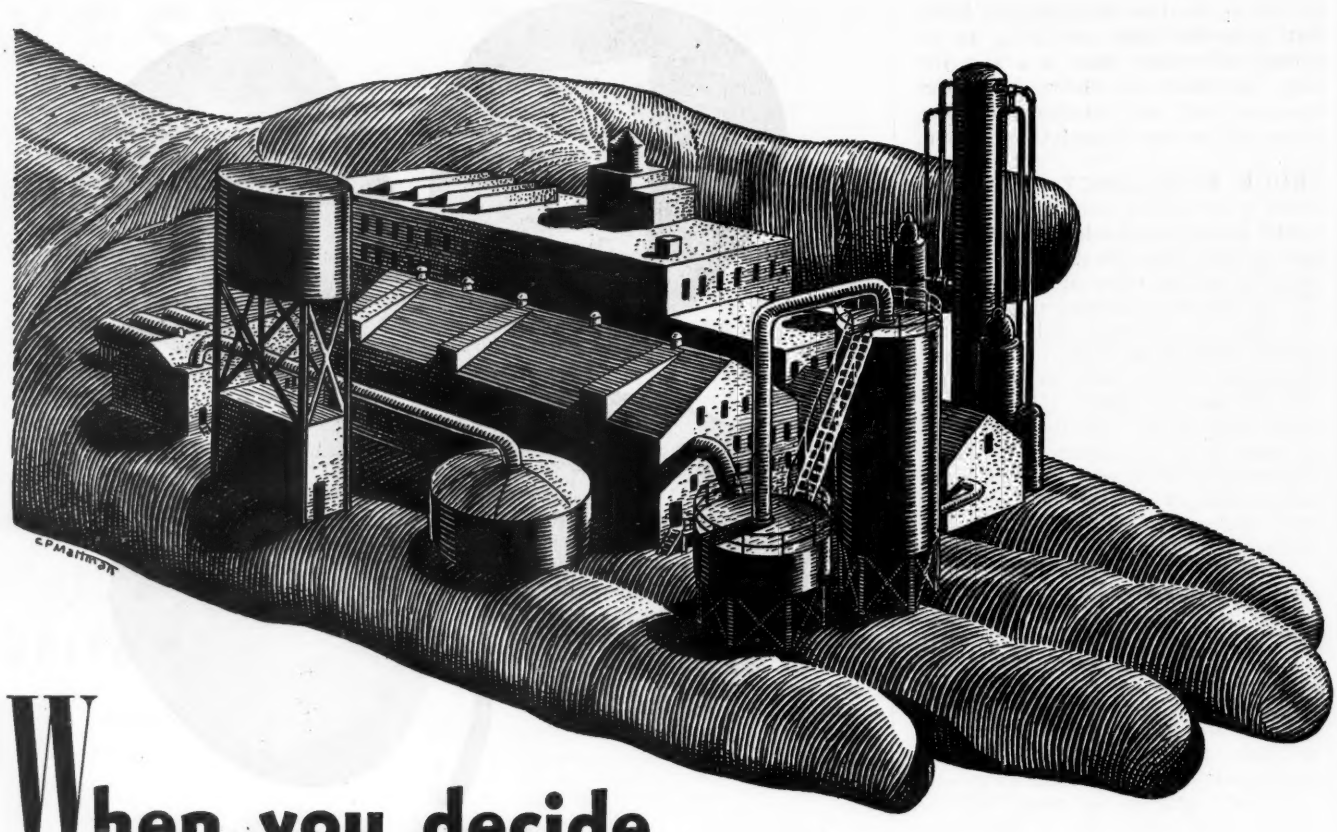
METHYL SALICYLATE, (U.S.P.)—Synthetic oil of wintergreen for flavoring foodstuffs and beverages.

VANILLIN MONSANTO, (U.S.P.) — Synthetic vanilla flavoring for foodstuffs and beverages.

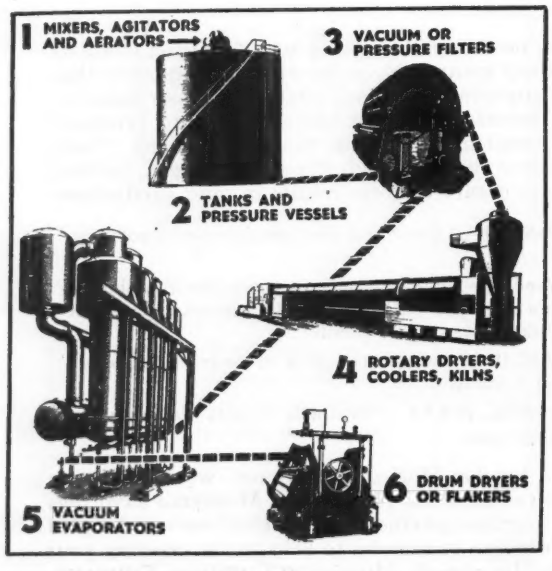
Unless you are a regular Monsanto customer, we may not be able to supply you commercial quantities of Monsanto flavorings under restricted wartime production. However, we will be glad to send you information or samples to help you in creating your postwar products. Inquire of: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Montreal, Toronto.

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND



When you decide on your new plant or process!


1 MIXERS, AGITATORS AND AERATORS
2 TANKS AND PRESSURE VESSELS
3 VACUUM OR PRESSURE FILTERS
4 ROTARY DRYERS, COOLERS, KILNS
5 VACUUM EVAPORATORS
6 DRUM DRYERS OR FLAKERS

When your engineers or consultants have planned that ideal new plant or process you want—*then* have one thoroughly competent equipment manufacturer assume full responsibility for delivering *"the complete package"*.

It can be done. General American Process Equipment is set up to give you just that kind of service. This organization embraces five outstanding manufacturers in the process equipment field, supplemented by an engineering and research staff of international reputation, and backed by the General American Transportation Corporation. *It offers you a combination of technical and economic advantages which we believe is unique in industry.*

"One organization, one responsibility, one highest standard of performance." Let us tell you exactly what that means in the design, manufacture and installation of process equipment. *Address:*

GENERAL AMERICAN PROCESS EQUIPMENT

A Division of

GENERAL AMERICAN TRANSPORTATION CORPORATION

Composed of: LOUISVILLE DRYING MACHINERY CO. • THE TURBO-MIXER CORP. • CONKEY FILTER COMPANY • AMERICAN MACHINE COMPANY

Associated with PLATE AND WELDING DIVISION

425 BAXTER AVENUE, LOUISVILLE 4, KENTUCKY

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

MEN • JOBS • COMPANIES

INDUSTRY

American Processing Co., New York, has been appointed exclusive civilian sales representative for J. R. Simplot Dehydrating Co., Caldwell, Idaho. The company will receive dehydrated potatoes from Simplot in bulk and package the product in consumer-size containers for domestic distribution.

Froedtert Grain & Malting Co., Inc., Milwaukee, Wis., is considering a postwar expansion program which would include building a large malt house on land owned by the company adjacent to its present Milwaukee plants.

Kveldulfur, Ltd., Hjalteyri, Iceland, is installing a modern fish reduction plant, completely equipped with processing machinery to enable the firm to have an hourly production capacity of 25 tons of herring.

B. E. Maling Co., Hillsboro, Ore., has completed the construction of a new quality control and horticultural laboratory. K. C. Fenner is in charge of quality control and Leon Hubbard is horticulturist.

Samuel Martin Game Farm, Seattle, Wash., has discontinued all freezing operations and is continuing to can only.

National Sugar Refining Co., New York, has recently acquired additional property where it plans to construct a building to house its home office in the postwar period.

Safeway Stores, Inc., recently has acquired El Paso Packing Co., Tex. The firm plans to continue operation of the retail meat markets of El Paso, as well as the slaughtering plant. Another plant recently bought by Safeway is South San Francisco Packing and Provision Co.

J. R. Simplot Dehydrating Co.'s plant at Caldwell, Idaho, has been damaged by fire to the extent of $50,000. The company is contemplating freezing and canning operations in 1945.

Springbrook Packing Co., Springbrook, Ore., is completing the construction of a cold storage and freezing building. The new plant is expected to handle 5,000 barrels of cold pack fruits.

Stokely Brothers & Co., Indianapolis, has acquired Crampton Canneries, Inc., Celina, Ohio, including that company's controlling stock interest, in W. R. Roach Co., Grand Rapids, Mich. The purchase gives Stokely a total of more than 50 food processing plants in the principal canning regions of the country.

JOEL S. MITCHELL

CHARLES N. FREY

Standard Brands, Inc., New York, has elected Charles N. Frey, director of Fleischmann Laboratories, to head a new department of scientific relations recently formed to coordinate the company's widespread research activities on foods and other products. Another new company appointment is that of Joel S. Mitchell, formerly first vice-president and director of Kellogg Co., who is joining Standard Brands to become a director and vice-president in charge of foreign operations.

Tennessee Cold Storage & Warehouse Co., Memphis, Tenn., had between 25 and 40 carloads of meat, fruit and vegetables destroyed by fire, which swept through its plant.

United Growers, Inc., at Liberty, Ore., is completing a new cannery and frozen food preparation plant to supplement its present operations in that region.

Washington Cooperative Egg & Poultry Association's Lynden cannery has broken all previous production records and is producing to capacity. It will utilize several million pounds of poultry and turkeys during 1944 for both the armed forces and civilian use.

H. N. BROCKLESBY

H. N. Brocklesby, who for the past two years has been on the West Coast as director of research of the Farallone Division of Borden Co., has been appointed coordinator of research and laboratories of the Special Products Division of the company, with headquarters in New York. Formerly chief chemist of Fisheries Research Board of Canada, Mr. Brocklesby is internationally known for his work on marine animal oils and was a pioneer in the utilization of fish oil for many purposes.

PERSONNEL

Roy A. Asmussen, who has been associated with the dehydrated food industry and Little & Co., Inc., Chicago, for many years, has resigned as vice-president of that company to open up an office of his own representing Deshidratadora Nacional de Platano Tabasco S. S., Mexico, and Folk Farm Products of Oklahoma. His headquarters still will be in Chicago.

Fred Beaudette, professor of poultry pathology at Rutgers University and poultry pathologist at New Jersey State Experimental station, has been presented the seventh annual Borden Award in poultry science.

Samuel M. Blakemore has been appointed head of a new department of chemical research and development for Churngold Corp. He is now engaged in working with vegetable oils as they relate to the production of margarine.

S. M. Cantor and A. N. McFarlane of the research department of Corn Products Refining Co., Argo, Ill., have been

STONES Good Buy!

Costly and wasteful are most mill processes for "stoning" cereals, soy-beans and other dry-processed foods. Now, at relatively small investment, the process is streamlined, costs cut to a fraction of old, laborious, hand or semi-hand picking methods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soy-beans, and other beans, and other food products, with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour. Write for Bulletin FI-944.

SUTTON, STEELE & STEELE, Inc.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign — Separations Engineering, Ltd., 133 Bush House, Aldwych, London

promoted to assistant and associate directors of research, respectively.

Rowland J. Clark, formerly director of research for Shellabarger Mills, Salina, Kan., is now a member of the technical staff of W. E. Long Co., Chicago.

George Clement has been appointed vice-president of Schuckl & Co., Sunnyvale, Calif.

James F. Donohoe and Frank P. McCartin, both of Lowell, Mass., have been made directors of Harvard Brewing Co., Boston.

John M. Foster, vice-president of John Morrell & Co., and manager of the Sioux Falls plant since 1939, has been elected vice-president in charge of operations with headquarters in Ottumwa, Iowa, succeeding his brother, G. M. Foster, who was elected president of the company. Ralph W. Rausom has been named superintendent of technical operations and construction. He has been assistant to the president.

J. G. Funch, formerly with Hunt Bros. Packing Co., has been appointed quality-control manager of S. A. Moffett Co.'s three plants.

Alexander H. Hostettler is still master brewer and technologist at Ohio Brewery, Inc., Columbus, Ohio.

Melvin Jensen succeeds George Radich as manager of Columbia River Packers Association's Reedsport, Ore., plant.

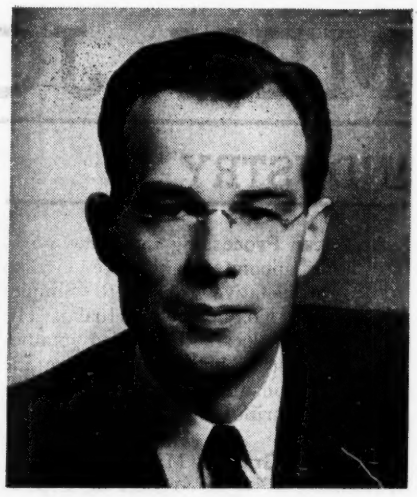
Mack E. Kittay has returned to National Starch Products, Inc., after two years in the service and has been appointed manager of its southern division with headquarters in Houston, Tex.

Philip N. Mark has become general manager of Tri-Valley Packing Association, San Francisco, Calif., succeeding George N. Pharr, who is now a consultant for WFA in Washington. Mr. Mark also succeeds Mr. Pharr on the board of directors of the Canners League of California.

Earl McCaughan, formerly with Snider Packing Co., is now superintendent of S. A. Moffett Co.'s Mt. Vernon, Wash., frozen food plant.

Karl B. Norton, long associated with the frozen foods and canning industries, has been elected production manager of Standard Brands, Inc.'s, frozen fruit and vegetable operations. He is widely recognized as an authority on frozen foods and will, in his new post, aid in the further development of Standard Brands' frozen fruits and vegetables.

Perry E. Piper has been elected procurement manager of Beatrice Creamery Co., Bloomington, Ill. He was formerly plant manager of Baker-Stuber Dairy, Inc., Peoria, Ill.



R. A. REINECKE

R. A. Reinecke has been named a vice-president of Harold H. Clapp, Inc., the Rochester, N. Y., baby food company. Mr. Reinecke joined the Clapp organization in 1933 as a food chemist and later was put in charge of and developed its modern laboratory. He also serves G. Washington Coffee Refining and P. Duff & Sons, Inc., in an advisory capacity, in addition to his other duties.

C. W. Sadd, Ithaca, N. Y., has been elected general manager of Cooperative P & C Family Foods, a farmers' cooperative for the marketing of foods produced on Northeastern farms. He had been head of Cooperative G. L. F. Farm Products.

James T. Settlemeyer has been named head of the mechanical engineering division of General Foods Corp.'s Central Laboratories, Hoboken, N. J.

K. H. Stevens has become president, and Edgar M. Burns and L. E. Kern, vice-presidents, of Terminal Ice & Cold Storage Co., Portland, Ore.

G. C. Supplee heads an analytical and consulting organization known as G. C. Supplee Research Corp., Bainbridge, N. Y. He formerly had been associate director of reasearch for Borden's.

DEATHS

George K. End, 49, president of Floridian Products Corp., Rattlesnake, Fla., recently, in Tampa, Fla. Mr. End operated the only plant where rattlesnake meat was canned commercially in this country.

Jules Fribourg, 66, president of Continental Grain Co., New York, recently, in New York. He has been in the grain business for more than 50 years.

Frank G. Hall, 73, president of Stein-Hall & Co., Inc., and its three subsidiaries, July 30, in Hanover, N. H.

Joseph W. Mackenzie, 61, and at one time president of Mansfield Milling Co.,

Fall River, Mass., July 28, in Waban, Mass.

Samuel G. Pack, 73, general personnel manager of Bowman Dairy Co., Chicago, August 6, in Chicago.

C. E. Perkins, who was vice-president and field director for Foster and Wood Canning Co., Lodi, Calif., recently, in Santa Cruz, Calif.

Joseph P. Reynolds, 54, former president of Richmond Fruit and Produce Co., Richmond, Va., August 5, in Wind Gate, Pa.

John H. Thomas, Jr., 44, assistant treasurer of General Foods Corp., New York, August 2, in Flushing, N. Y.

ASSOCIATED INDUSTRIES

American Can Co. plans to establish, postwar, one of its largest manufacturing units in St. Louis. This plant will supply canners in the Ozark area.

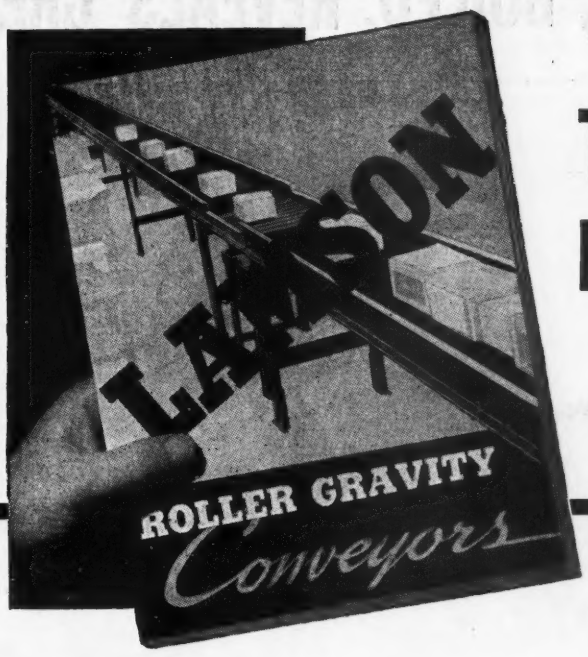
John Barnard has opened up a market research and trade data service in Johannesburg, S. A., for the development of postwar trade in many industries between South Africa and Rhodesia and the United States.

Goodyear Decatur Mills, Decatur, Ala.; Kold-Hold Manufacturing Co., Lansing, Mich.; and the Stamford Division of Yale & Towne Manufacturing Co., New York, have been presented the Army-Navy "E" for excellence in production. The following companies have been presented the "E" for the second time: Cochrane Corp., Philadelphia, Pa.; Foxboro Co., Foxboro, Mass.; the Philadelphia plant of Container Corp. of America; and Sarco Co., Inc., New York. Builders Iron Foundry, Providence, R. I., has been given a third star for its pennant; Buffalo Pumps, Inc., North Tonawanda, N. Y., and Handy & Harman are both flying an "E" with four stars.

Jessop Steel Co., Washington, Pa., through the addition of new production equipment, now is able to furnish fabricators with light gage stainless clad steel sheets. The clad sheets are recommended for such applications as steel jacketed kettles, various cooking utensils and cold storage room linings.

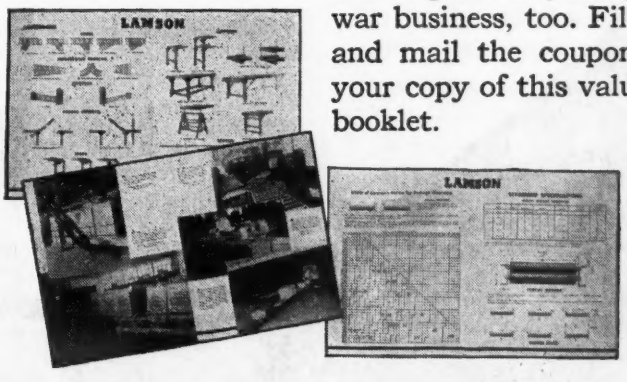
Walter M. Mitchell has been appointed director of research for Mack Trucks, Inc., New York. He will direct chemical, metallurgical, lubricant and other research activities allied to the firm's products.

S. B. Penick & Co., New York, has acquired Compagnie Duval, also in New York, manufacturer of flavor concentrates and allied products.



THIS BOOK ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

TELLS YOU . . . how to move your products faster, more efficiently, more economically. In war-busy food warehouses and processing plants, Lamson Roller Gravity Conveyors are eliminating waste motion, adding to the productivity of manpower, reducing costs, and providing better control of stock. Let us show you how Lamson Roller Gravity Conveyors can take an active part in your postwar business, too. Fill out and mail the coupon for your copy of this valuable booklet.



LAMSON CORPORATION ★
Syracuse 1, N. Y.

Please send me free copy of booklet describing Lamson Roller Gravity Conveyors.

Name ..... Position .....

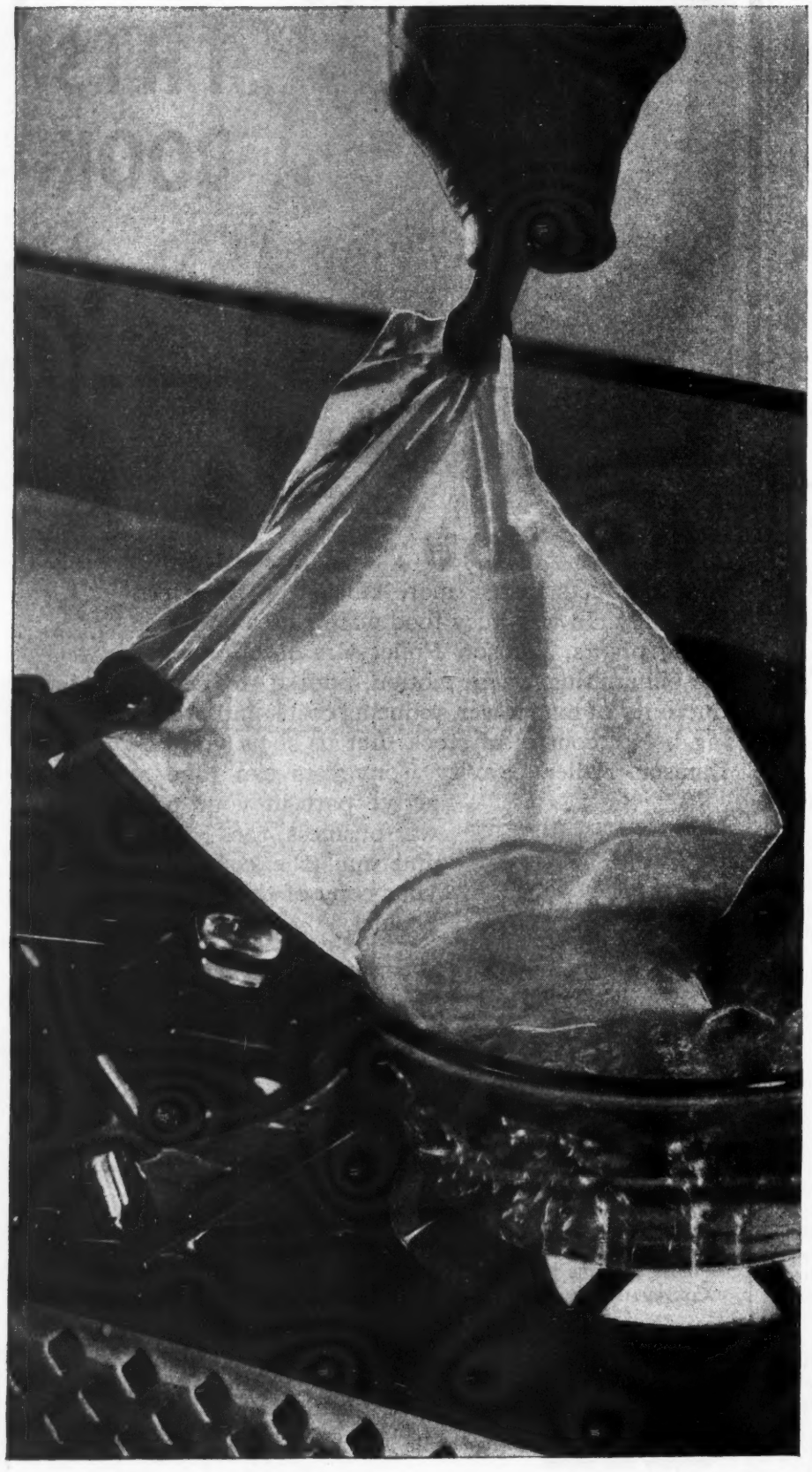
Company .....

Address ..... State .....

Because of the demand for this booklet it can be sent only to those who name their company and position.

LAMSON CONVEYORS

PATAPAR, BOILED, REVEALS GREAT WET-STRENGTH



If a paper can be boiled four hours and come out firm and strong, that really is wet-strength. This sheet of Patapar has just undergone this severe test

Withstands Oil, Fats, Live Steam, and Freezing

Patapar Vegetable Parchment can take punishment you'd believe impossible for paper. It resists penetration of grease, oil, hot fat. It will stand up under scorching hot live steam. It can be frozen in ice — thawed out and remain intact and strong.

These are some of the qualities that have enabled Patapar to solve so many tough problems of packaging and protection.

179 Types of Patapar

Patapar is produced in a variety of types to cover a wide range of situations. There are types to handle problems of extreme grease or moisture penetration. Another type of Patapar resists penetration of air. There's a Patapar for food products which must have wrappers that allow them to breathe. All in all, 179 types of Patapar have been perfected for the different needs of different products.

Patapar is the ideal material for:

Wrappers for butter, meats, fish, cheese, poultry, shortening, ice cream, vegetables, dried fruits

Carton and box liners
Bulk packaging units
Milk can gaskets
Milk bottle hoods
Packaging coffee & tea

And many other uses

Complete Printing Service

One of the features of Patapar is the way it can be printed with colorful and attractive designs. Our plant is equipped with complete modern facilities for printing Patapar in one or more colors by lithography or letter press. Every detail is handled by skilled experts.

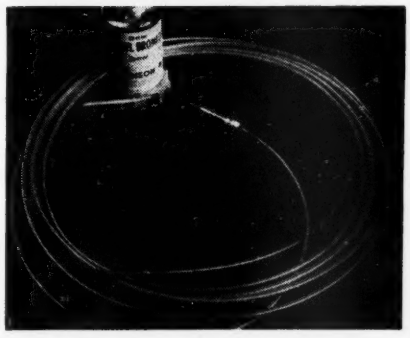
Note to business planners

With the present shortage of pulp, the manufacture of Patapar is restricted to limited weights and finishes, and its use confined to war assignments and essential civilian requirements. However, inquiries are welcome from business men who would like to investigate Patapar for future needs.

Patapar
Reg. U. S. Pat. Off.
Vegetable Parchment

Paterson Parchment Paper Company
Bristol, Pennsylvania
West Coast Plant: 340 Bryant St., San Francisco 7, Cal
Branch Offices: 120 Broadway, New York 5, N.Y.
111 West Washington Street, Chicago 2, Ill.
Headquarters for Vegetable Parchment since 1885

FOOD EQUIPMENT NEWS



Boxcar or vault fumigator.

Boxcar Fumigator

WITH the aid of flexible, translucent Saran tubing, foodstuffs in boxcars can be fumigated from the outside of the car, according to Dow Chemical Co., 1014 Jefferson Ave., Midland, Mich. One end of the applicator tubing is attached to a 1-lb. can of methyl bromide and the other end is placed in the car. This method, it is stated, allows overnight fumigation of foodstuffs which must be protected against infestation.

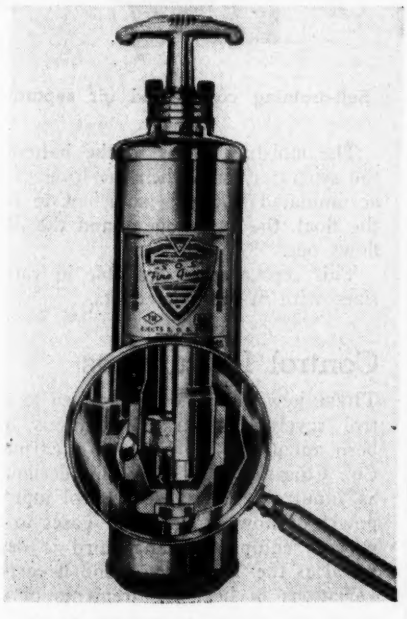
Saran tubing is said to be highly adaptable to this type of fumigation because of its chemical resistance and flexibility.

Quick Extinguisher

FAST ACTION against electrical, oil and gasoline fires is claimed for the SOS Fire Guard extinguisher developed by General Detroit Corp., 2770 East Jefferson Ave., Detroit 7, Mich. It is made in small 1- or 1½-quart sizes and may, therefore, be installed wherever hazards are present.

One of the features of this fire fighter is a patented Safety Phlare design of the lower end of the pump cylinder. The cylinder is expanded at the bottom to insure a free-floating piston action, even after long periods of disuse.

The extinguisher also has a panic-proof safety lock actuated by turning the handle either right or left. Cap, stuffing box, handle lock and handle seal are a single piece brass drop forging eliminating all interior soldered joints.



Small, handy fire extinguisher.

High-pressure Pump

PUMPS which will develop discharge pressures of 500 p.s.i. have been announced by Blackmer Pump Co., Grand Rapids, Mich. These are of all-iron, bronze-fitted construction. The rated capacities are 50 and 90 g.p.m. for discharge pressures to 500 p.s.i. Units are available either for standard motors or for engine drive.

The result of two years of development work, these pumps employ the bucket design, swinging-vane principle.

Spray-on Wax

WAX can be sprayed on large floor areas to leave a high-gloss nonslip finish without buffing is announced by Turco Products, Inc., 6135 South Central Avenue, Los Angeles 1. Called Grip-wax, it is designed to withstand the use of heavy traffic where frequent waxing applications are usually necessary.

According to the manufacturer, the antiskid safety qualities of the material insure secure footing on all types of floors, including slip hazards on cement floors.

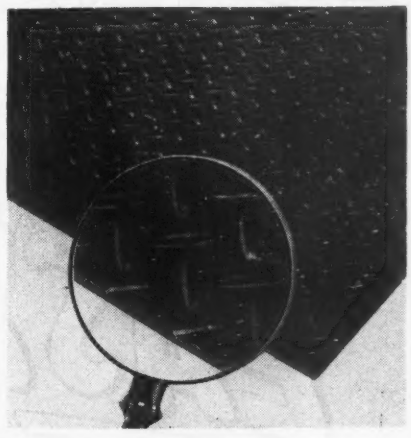
It is a free-flowing quick-setting liquid which is easily applied with a light wiping motion or by atomizing spray rather than by arduous rubbing. There is no solvent action on asphaltic tile, rubber or linoleum.

Gear Reduction Unit

SPEEDAIRE worm gear reduction units, incorporating a fan cooling system which permits a pronounced reduction in the size of the unit, have been announced by Cleveland Worm & Gear Co., Cleveland, Ohio.

The basis of the cooling system is a new type of double-wall construction. This provides an air passage completely enveloping the oil reservoir in which the gear operates. The inner housing wall forming the oil reservoir is deeply finned on the air side, resulting in a marked increase in the heat-dissipating surface.

It is claimed that when the unit runs at usual speeds the operating temperature is greatly lowered due to the rapid heat transfer. This gives the Speedaire a greater load-carrying capacity.



Nonslip plastic matting.

Plastic Matting

SOLID PLASTIC friction-type matting has been made available by American Mat Corp., 1797 Adams St., Toledo 2, Ohio. It can be used in many places where rubber matting formerly was used, such as building entrances, lavatories, shower and locker rooms, halls and stairs.

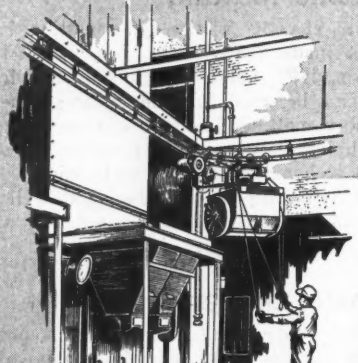
This nonslip matting does not swell as rapidly as rubber where exposed to various types of oils.

Barrel Mover

HANDLING BARRELS and drums around a food plant is made easier by a removable barrel-handling device made by Yale & Towne Manufacturing Co., Philadelphia, Pa. Used in connection with Yale telescopic tilting fork trucks, this device has a special lifting fork and a metal loop which is dropped over the barrel by lever action after the fork has been slid underneath; the operator need not step off the truck. The barrel handling

Barrel-handling attachment for trucks.

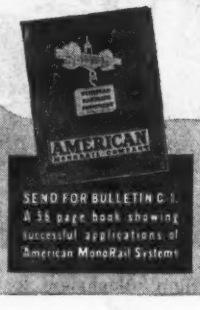
EASY HANDLING METHODS Usually Bring IMPROVED QUALITY!



With American MonoRail Overhead Handling Equipment, less time is spent in manual operations. This means more time devoted to better processing. Systematic movement compels constant accuracy of process and lower costs.

American MonoRail provides rapid, careful transfer from one operation to the other, from cooking and cooling process to piling or cartoned goods.

THE AMERICAN MONORAIL CO.
13125 ATHENS AVENUE . . . CLEVELAND 7, OHIO



Let an American MonoRail Engineer show you "all round savings" with this equipment. Write today!

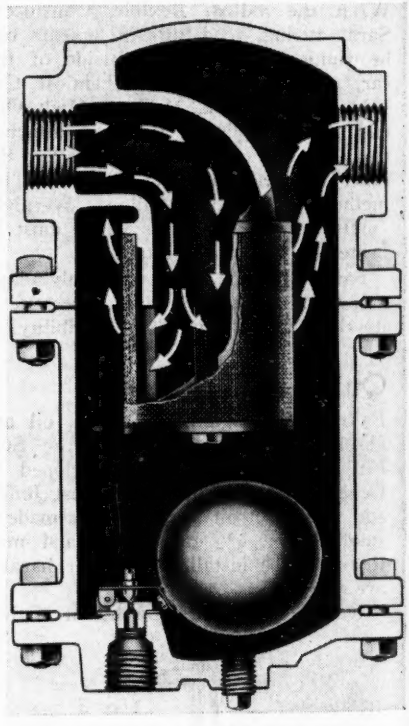
device can be removed and the regular forks installed for regular handling of materials in the plant.

Compressed Air Separator

EXTERNAL TRAPS and manual draining are said to be eliminated by the self-draining compressed air separator developed by Johnson Corp., Three Rivers, Mich. The unit is known as the Type SA separator.

Principles employed in the unit are (1) expansion, (2) change of direction and (3) a trap mechanism to automatically remove accumulated water and oil from the compressed air. This unit is credited with an efficiency of more than 99 percent.

The trap mechanism consists of a spherical float and a chrome steel valve and valve seat. It is mounted on the bottom plate of the separator body and can be removed easily for cleaning.



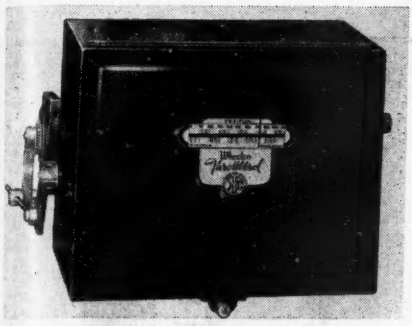
Self-draining compressed air separator.

The moisture drops to the bottom of the separator, and when the level of the accumulated liquid is sufficient to raise the float, the valve opens and the liquid flows out.

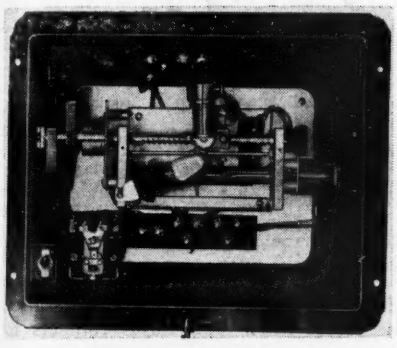
This separator is available in various sizes with ¾- to 2-in. inlets.

Control Instruments

THREE new instruments designed to control several industrial operations have been announced by Wheelco Instrument Co., Chicago 7, Ill. Two are designated as Inputrols, and these control input of power or flow of liquids or gases to any process equipment. The third is designated as the Throttletrol, and it corrects variations in heat requirements of furnaces and process equipment by positioning a valve in the fuel line.



Valve positioner for heat control.



Input controller for process equipment.

Inputrols are made in automatic and manually set models. The basic elements are a mercury switch mounted on a carriage, a spiral on which the mercury switch carriage is mounted and a rotating horizontal cylindrical cam driven by a small synchronous motor. In the automatic model, which is used with a pyrometer, the spiral is turned automatically to position the mercury switch carriage at the proper point along the rotating cam. In the manual model the spiral is set by hand to the input point desired by the equipment operator.

The Throttletrol is essentially a simplified valve-positioning device designed for use with any control instrument having a high and low contact. It corrects variations in heat requirements due to changes in load, control settings, air and fuel pressure, B.t.u. values and combustion efficiency.

Overheat Cutoff

THERE is a provision for manual reset of an overheat cutoff on the H 1 electric temperature control now offered by Commercial and Industrial Division, Robertshaw Thermostat Co., 30 Church St., New York 7, N. Y. The control consists of a standard Model D 1 double-pole, single-throw electric temperature control, equipped with an auxiliary single-pole, single-throw switch which will automatically cut off all current as soon as operating temperature is exceeded by 30 deg. F. in liquids, or 50 deg. F. in air.

The circuit is made through the contacts of the limiting device by pushing in the manually operated reset button. The contact is then made and held in place by a locking device, or safety catch, which is not disturbed by normal operation and does not act until excess temperatures create an additional movement

An Extra Arm

Helps Towmotor to Move 'most Everything!

Towmotor Fork Lift Truck plus the handy Towmotor Crane Arm and Hook attachment can move almost everything in plants. Towmotor's regular duties—lifting, moving and storing loads up to 10,000 pounds, traveling as fast as 880 feet a minute and building stacks as high as 25 feet—are greatly supplemented by the addition of the Crane Arm attachment. Here are some of the operations it performs:

Lifts and moves cumbersome, awkward-shaped machinery and materials with little or no under-clearance; reaches over obstacles such as highway truck bodies, flat cars, stock piles and plant machinery; handles all types of materials during plant construction or remodeling . . . helps materials handling equipment to more than pay its own way during slack periods!

Get complete details about Towmotor—investigate this materials handling equipment that stays busy the year 'round. Write Towmotor Corporation, 1222 E. 152nd Street, Cleveland 10, Ohio, and ask for Towmotor DATA FILE.

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Beckman pH Control Insures Product Uniformity!

By controlling pH (acidity or alkalinity) wherever water or water solutions are used in your production operations you can step up the efficiency and improve the quality and uniformity of your finished product... all important savings!

Beckman pH Control Minimizes Maintenance!

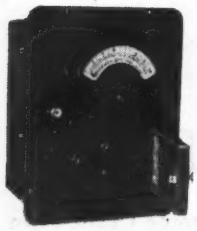
Costly corrosion of plant equipment, troublesome scale in boilers, condensers and other steam equipment are only a few of many maintenance problems minimized through accurate pH control.

THESE SAVINGS WILL BE VITAL in meeting post-war competition...

Beckman pH Control Reduces Waste!

By insuring more uniform quality of product with less plant maintenance, waste and "rejects" are reduced and equipment life is prolonged... a double saving in production costs!

Here's what you can do NOW to speed your Beckman pH installation!

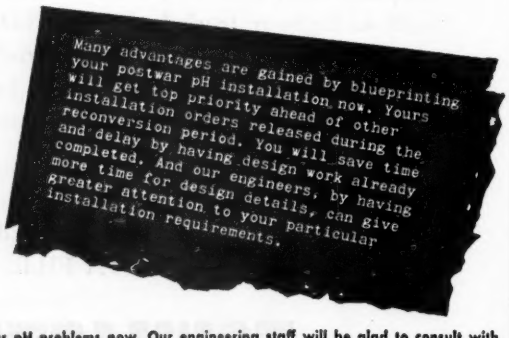


The Beckman Automatic pH Indicator—the most advanced instrument available today for fully automatic pH indication, recording, control. Send for Bulletin 16!

BECKMAN pH CONTROL has proved so important in saving time and in increasing the efficiency of war-time production operations that today practically all of our instruments are going to high priority war jobs.

But the same outstanding savings that Beckman equipment is making possible in war operations will prove equally vital in meeting the stiff competition of civilian postwar production. Regardless of your present priority situation you can start your Beckman pH installation *now*. Here's how . . Practically every Beckman large-scale process control application is individually engineered to the requirements of the particular job. This requires time and considerable detailed technical work by trained engineers to insure an installation exactly suited to your operations.

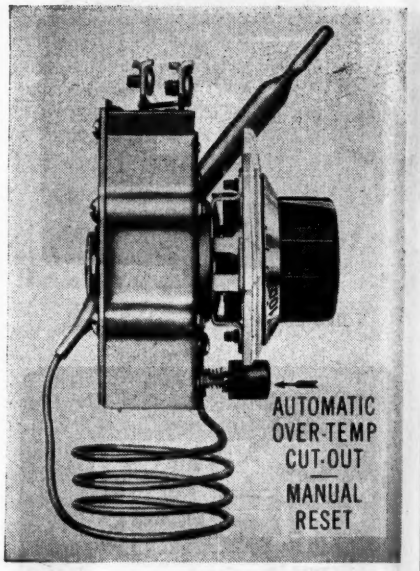
By letting us start *now* to study your pH requirements and to work out the particular type of installation best suited to your production problems, your Beckman pH installation can be completely designed and blueprinted *ready for immediate installation when war demands permit.*


Many advantages are gained by blueprinting your postwar pH installation now. Yours will get top priority ahead of other installation orders released during the reconversion period. You will save time and delay by having design work already completed. And our engineers, by having more time for design details, can give greater attention to your particular installation requirements.

Send us your pH problems now. Our engineering staff will be glad to consult with you on the best solution to your problems.

BECKMAN INSTRUMENTS NATIONAL TECHNICAL LABORATORIES South Pasadena • California

BECKMAN INSTRUMENTS CONTROL MODERN INDUSTRIES



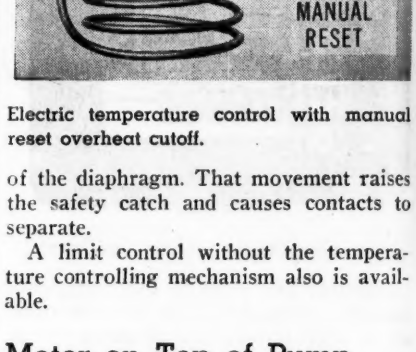
Electric temperature control with manual reset overheat cutoff.

of the diaphragm. That movement raises the safety catch and causes contacts to separate.

A limit control without the temperature controlling mechanism also is available.

Motor on Top of Pump

Now available are Amsco-Nagle centrifugal pumps of the horizontal type with the motor mounted atop the unit. These are made by the American Brake Shoe



Pump with overhead motor.

Co., Chicago Heights, Ill. Advantages are said to be more accurate pump speed, motor accessibility and protection of the motor from flooding. This arrangement also requires less floor space.

Small Twin Pump

Two different liquids may be pumped simultaneously with the twin pumping unit announced by Blackmer Pump Co., Grand Rapids 9, Mich. Designed to handle fuel oil, lubricating oil and similar liquids, the unit consists of two pumps mounted on a cast bedplate and connected through semi-enclosed reduction gears to an electric motor. The pumps are available as all-iron, bronze-fitted or all-bronze construction. Each pump has a capacity of 3 g.p.m. at a discharge pressure of 100 lb. per square inch. Pump speed is 570 r.p.m.

Horizontal-plate filter.

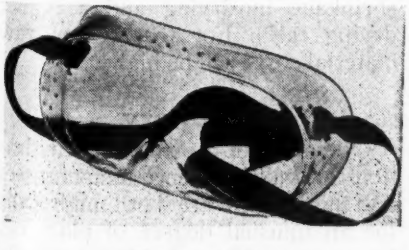
Horizontal-plate Filter

Oil becomes fouled after use in deep-fat frying, and ultimately is discarded because it becomes unfit for further use. By using a Sparkler filter to clarify the fat in deep fat frying, its life can be considerably prolonged, since the filter removes the residue which fouls the fat. In addition to lengthening the life of the fat, it is claimed that the product is considerably improved in appearance as well as in taste.

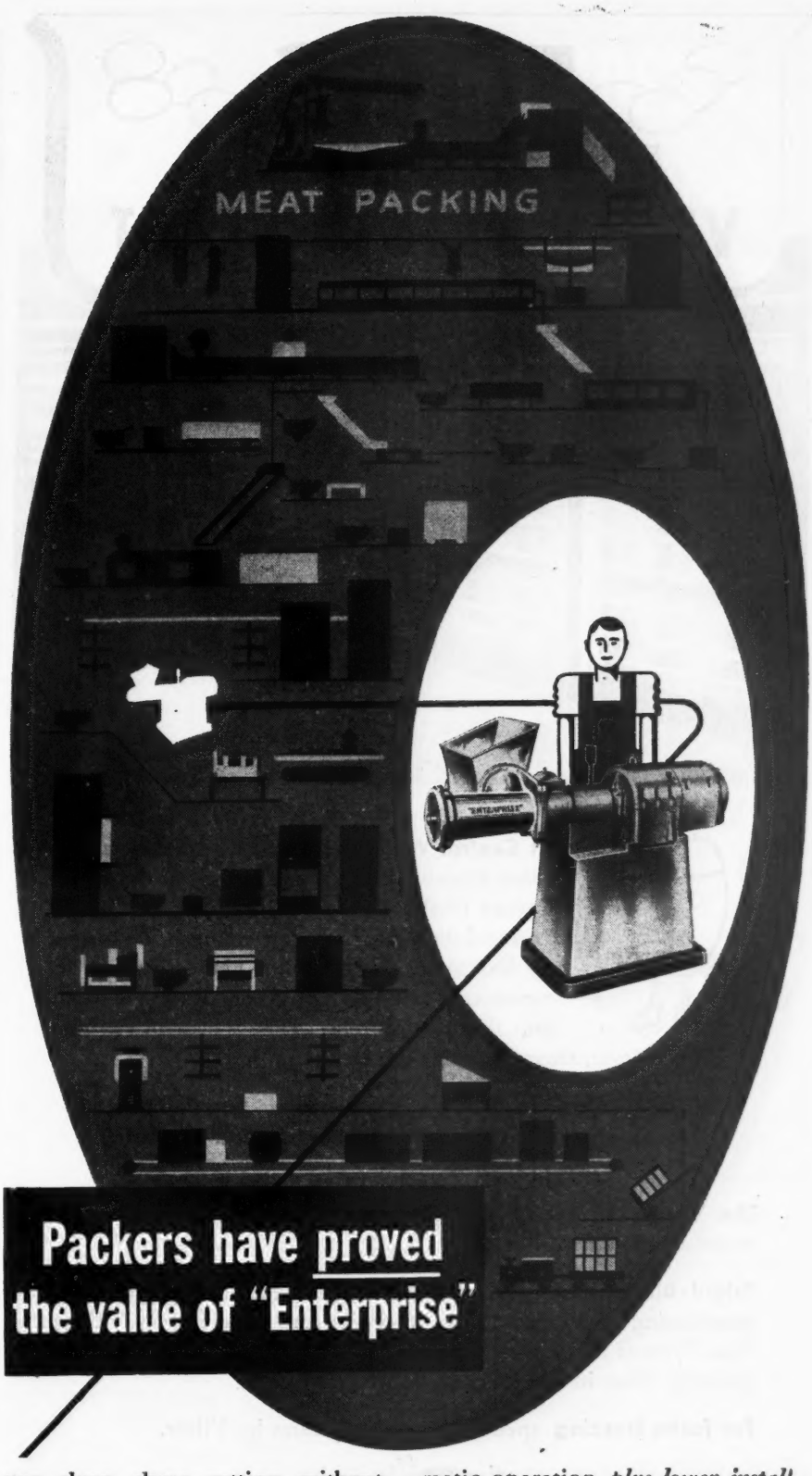
It is stated that the Sparkler horizontal-plate design permits of intermittent operation of filter without disturbing the filter cake, as well as preventing residue from falling into liquid at the end of run. This unit is manufactured by the Sparkler Manufacturing Co., Mundelein, Ill.

Plastic Goggle

Goggles of crystal-clear non-inflammable plastic are being manufactured by U. S. Safety Service Co., Kansas City, Mo. The design is such as to allow clear vision both to the front and sides, and the goggle can be worn over glasses. The goggle is treated to minimize scratching and is so constructed that the lens does not touch when placed on a table. The thickness of the plastic is nearly 1/16-in. and the goggle weighs about 1½ oz.



Plastic goggle.



for clean shear cutting without mashing or tearing the material, "Enterprise" has proved *outstanding*—and not only for packers, but for confectioners, ice cream makers, catsup makers, soup makers, indeed nearly *all* types of food processors.

"Enterprise" offers other big advantages, too . . . adaptability to fast production lines, fully automatic operation, *plus lower installation, operating and maintenance costs.*

If you will let us know your specific reduction problem, we shall send you information on models best suited to your needs.

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EGGS
Frozen Faster with
VILTER FRIGID BLAST

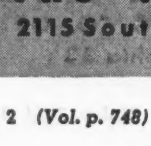
At Central Warehouse, St. Paul, Minnesota, the Vilter Frigid-Blast Freezing system shown above freezes fresh eggs in 30 lb. containers on an "Around-the-Clock" schedule. Whole, fresh eggs are broken, tested for quality, poured into 30 lb. containers, loaded onto platform skids and wheeled into the freezing cells. Here a blast of sub-zero air is forced over, around and through each skidload.

RESULT: Quality, frozen eggs in *shorter freezing* time. And the original equipment investment and operating cost is surprisingly low.

The Vilter Frigid-Blast Freezer at Central Warehouse also freezes meats and poultry.

Frigid-Blast Freezing is only one of many developments at Vilter contributing to improved food processing and storage today. Frigid Blast Systems are used to freeze all types of food products in any quantity, either in batches or by continuous process.

For faster freezing specify complete systems by Vilter.



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Dehydrated Foods

(*Continued from page 78*)

given off by the product stored at elevated temperatures and gradually built up a pressure in the cans. The air-packed cans stored at 130 deg. F. contained as much as 60 percent CO_2 after three months. The effect at the other storage temperatures was less marked, although 30 percent CO_2 was found in the air-packed can stored at 98 deg. F. for one year. At 75 to 80 deg. F. the air-packed cans contained 6 percent CO_2 after one year of storage.

3. *Effect of Lower Moisture Content*—The results indicate that dehydrated beets of 3.7 percent moisture content deteriorated slightly less than that of 4.9 percent moisture. This was true chiefly of those stored at 98 deg. F. The difference in deterioration between the beets of the two moisture contents was more evident at the later examinations, especially in regard to the amounts of CO_2 evolved.

Weather and Dehydration

(*Continued from page 79*)

ment but a tight room and doors that seal tightly, or air leaks will undo the work of the air conditioner.

The foregoing equipment to produce very low relative humidity in the finishing rooms is desirable even where the product is flaked instead of ground to a powder. The exposure of 4 percent products to high humidities on inspection belts and in packing departments often results in a moisture pickup of from 1 to 4 percent, thereby greatly impairing quality. Moistures under 4 percent should be the rule rather than the exception.

Very low moisture content in the finished product is as important to perfect keeping quality in storage as is the proper control of temperatures and humidities during the drying operation.

It must be remembered that vegetables grown in semitropics average much higher in water content than the same crop grown in more moderate climates. This means a greater shrinkage in drying and a higher drying ratio. For this reason raw material costs will be higher.

Summary

Operation of a plant for dehydration in localities where temperatures and humidities are both high calls for an unusual degree of planning. Crop maturities must be perfectly

synchronized with plant operations so that there are no delays, or icing or cold storage facilities must be provided to hold surplus crops without deterioration. Multistage drying becomes imperative, with provisions for the use of conditioned or dehydrated air in the final stage. Conditioned air of very low moisture content must be used in all rooms where final inspection and packaging is carried out or where any other operations like grinding are performed on the dried material.

On the Australian Scene

(Continued from page 67)

familiar in the United States. In the tilting kettle, steam enters one trunnion and condensate passes out the other. This arrangement, though facilitating easy dumping of contents, which is a factor in the case of jams, generally keeps the bottom of the inner bowl submerged or else wet with condensate and is not regarded as efficient as the stationary kettle with condensate draw-off near the bottom outlet boss.

The most modern plants use steam traps to remove condensate, but the older ones prefer to get along without them and use a "cracked valve" to drain off water from steam lines or jackets.

Fuel Situation

Coal is very difficult to obtain, and there has been an extra problem in fuels during the past year due to the same sort of labor troubles we have experienced in the States. Australia has neither petroleum nor natural gas resources. Most of the coal is available only to plants in localities near the ocean, whereas inland plants frequently use wood for fuel. Wood gives only about 60 percent of the evaporation per square foot of grate surface that would be obtainable from 14,500-B.t.u. coal. Enormous piles of firewood are common sights at many food processing plants.

Wood also is used for fuel for many of the newly built dehydrating plants. It is not so easily controlled as steam, gas or oil but seems to do a satisfactory wartime job.

Dehydration Plants

Nearly all the dehydration plants I have seen in Australia are modifications of the center-exhaust tunnels first developed by C. C. Eidt in Canada. Most of them have been designed for three-stage drying, with

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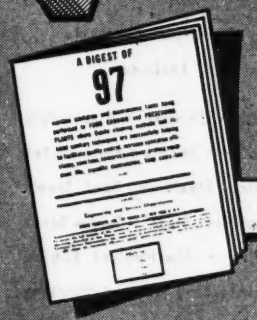
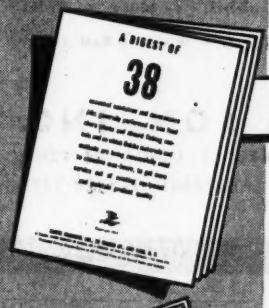
If you pack, can or quick freeze meat, poultry, fish, fruits, vegetables and other foods . . . send for whichever one of these 4 OAKITE SANITATION DIGESTS applies to your work. All are based on successful experience in hundreds of plants . . . each gives you helpful ideas and tested methods for more easily and economically handling essential equipment clean-up and maintenance tasks.



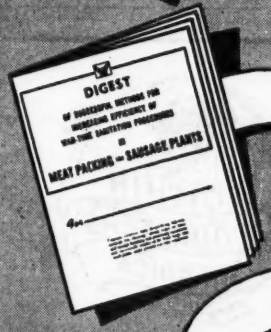
1. FOOD CANNING DIGEST

24 pages outline specific data on 97 different cleaning, sanitizing, de-scaling, rust removal and related tasks. A helpful guide in safeguarding product quality . . . extending useful life of processing and handling equipment.



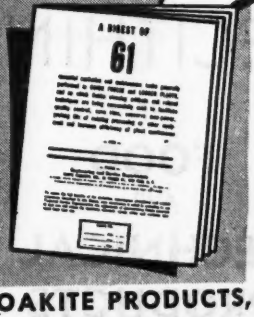
2. FISH CANNING DIGEST

Contains 8 pages of data on economical methods for keeping all fish processing and handling equipment in sanitary condition. Describes methods for safely cleaning over 38 different types of aluminum, galvanized, stainless steel, tinned and Monel equipment. All fish canners, processers, filleters and fleet operators should have a copy.



3. MEAT PACKING DIGEST

Prepared for meat packing and sausage plant superintendents. Concisely reviews from "A" to "Z" widely used, safe methods for handling over 58 essential plant sanitation and equipment maintenance jobs. 17 pages.



4. QUICK FREEZE & LOCKER PLANTS

This 12-page Digest gives time-saving tips on 61 different, commonly recurring sanitation and maintenance tasks. Describes performance-proved procedures for cleaning processing and plant equipment of all types.

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a finishing bin as the third stage. But delays in deliveries have prevented their completion, and they have been operating at far less than capacity on two stages.

One plant, which is different, is equipped with five counter-current tunnels. This plant is doing a stunt that I have always believed to be theoretically possible—using the dehydraters as three-stage dryers by maintaining conditions in the tunnels so that one tunnel is a first-stage dryer, while the next two are second-stage and the last two third-stage dryers. The truck loads of drying potatoes are shifted from one stage to the next on an appropriate schedule. It seemed to be working out as well as if the whole plant had been designed for that particular purpose instead of for its original use as a fruit dryer.

One of my personal idiosyncracies has always been that I do not like water on floors in food plants, and it was a source of much satisfaction to find three plants of recent construction which have dry floors. They are designed with what are termed "well floors" or "recessed floors" to prevent the water from flowing to places where it is not wanted. The well is nothing but a 2-in. depression under a machine that is connected to a suitable drain or gutter. The shallow wells keep the floor dry where it should be dry.

Amenities Buildings

In Australia you hear the word "amenities" used more frequently in a week than in the United States in five years. In America it refers to the nicer things of life. Amenities out in the "bush" are sanitary comforts, radio, telephone, water supply piped into the house, and the like. Organized labor has demanded amenities in factories as part of the working conditions, and many of the so-called amenities buildings are really things of beauty. In America, we would refer to them by some such term as Employees' or Welfare buildings. Even in a small plant in a country town in Australia the Amenities Building is equally as good as the office. Under the law they must cost a definite amount. They house the employees' lockers, toilet facilities, shower baths, first aid room, rest rooms and eating facilities. The latter are merely a place to eat in comfort, with facilities for brewing the inevitable cup of tea and for warming meat pies. Not all the places that I have seen sell food, but they do sell soft drinks. In rural food plants, the Amenities

Building becomes the center of the social life of employees.

Fruit Juices Yield Yeast

(*Continued from page 70*)

Essentially the same amount of ammonia must be used whether the yeast is grown on fruit juices, molasses or other sources of carbohydrate.

Vitamin Content

The content of B vitamins in torula yeast grown on fruit juice worts was studied and results are being presented in detail elsewhere.[10] Typical vitamin contents are presented in Table IV. The thiochrome method was used for thiamine and microbiological assay methods for the other vitamins.

The variations between results obtained with various fruits cannot be considered statistically significant. In general the values resemble those for unfortified bakers' and brewers' yeasts. Considerable amounts of certain vitamins were also found in the culture liquors.

Acknowledgment

The design of the fermenters was patterned after similar equipment used by the Peerless Yeast Co., San Francisco. The authors are indebted to Robert A. Clark and Jack Shaver of that company for valuable suggestions on construction. We are also indebted to Dr. E. C. Saudek of Consumers Compressed Yeast Co., Oakland, Calif., for many valuable suggestions and the use of pilot-plant yeast production equipment; to Dr. G. I. Jones of this Laboratory for thiamine determinations; and to the Northern Regional Research Laboratory, Peoria, Ill., for the culture of *Torulopsis utilis*.

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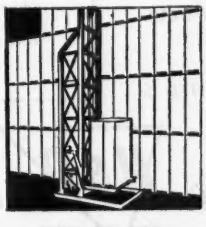
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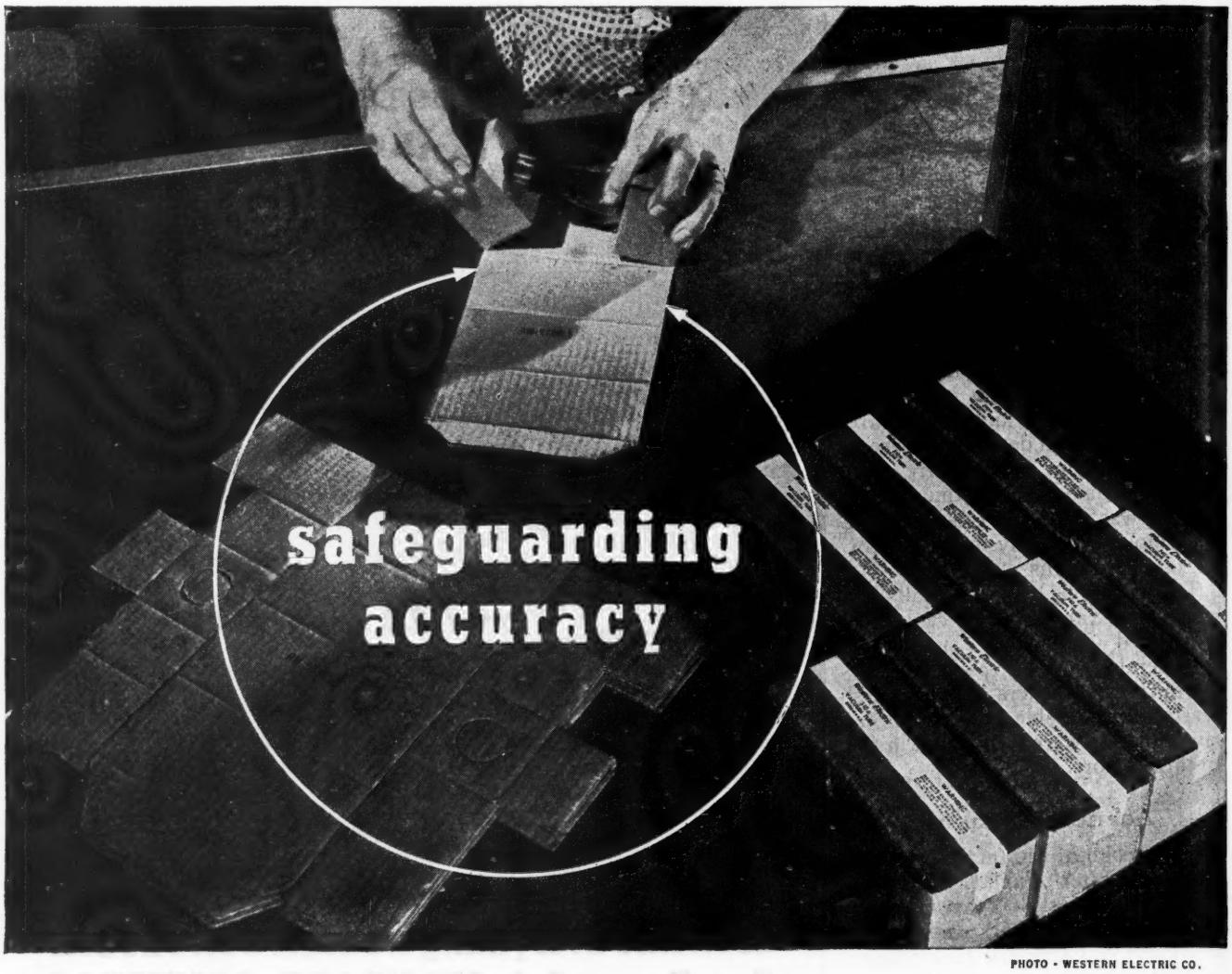

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FOOD PLANT EQUIPMENT

Automatic Water Stills—A 6-page folder containing specification tables and other technical data for five different types of water stills operated by gas, steam or electricity has been published by Barnstead Still & Sterilizer Co., Inc., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass.

Drying Equipment—The technic of drying is described in detail, and illustrations of such equipment as revolving shell dryers, calciners, coolers and rotary vacuum dryers are given, in Bulletin 1958 by Blaw-Knox Co., Post Office Box No. 1198, Pittsburgh, Pa.

Filling Machine—A machine used to fill packages weighing from ¼ oz. to 5 lb. is described and illustrated in a 4-page folder put out by Stokes & Smith Co., 4901 Summerdale Ave., Philadelphia, Pa.

Fork Lift Trucks—The role fork lift trucks play in the wartime movement of materials is illustrated by pictures of typical installations in a 34-page book published by Towmotor Corp., Cleveland, Ohio.

Vibrating Screens—Eight-page Catalog No. 1977 illustrating vibrating screens for recovering waste products from liquids and effectively reducing pollution, and including construction details, dimensions and weights of the various sizes of screens available, has been put out by Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

PLANT SUPPLIES

Adhesives—Many types of adhesives are listed and instructions on their application are given in the 8-page Catalog Section 9160 issued by B. F. Goodrich Co., Akron, Ohio.

Brine Process—The revised edition of "The Lixate Process for Making Brine" contains a complete table on sodium chloride brine at 60 deg. F. from 0 to 100 deg. sal. It is well illustrated with pictures of salt processing equipment. The booklet was issued by International Salt Co., Inc., Scranton, Pa.

Flavorings—A new price list for essential oils, citrus concentrates, tinctures and other flavoring products has been issued by Fritzche Brothers, Inc., Port Authority Commerce Building, 76 Ninth Ave., New York.

Resin Adhesives—The development, properties and applications of synthetic resin adhesives in industrial fields is outlined in the 6-page booklet entitled "The What, Where, Why, How of Resin Adhesives" published by National Adhesives Division, National Starch Products, Inc., 270 Madison Ave., New York 16.

Starch—Of use to manufacturers and chemists is the 16-page pamphlet, "Amioca, A New Domestic Starch." American Maize-Products Co., National Starch Products, Inc., and Stein, Hall & Co., Inc., jointly have prepared this booklet, which contains a number of photographs, charts, photomicrographs and tables of comparison with other industrial starches. Copies may be obtained from any of the three companies named above.

V-belt Drives—A forty-four page catalog on industrial fractional horsepower V-belt drives, covering the proper selection of drives and giving general engineering data has been published by B. F. Goodrich Co., Industrial Products Division, Akron, Ohio.

PACKAGING

Filler and Packager—An Automatic filler used with cleaning, capping and labeling equipment and a double package maker, which seals packages at speeds ranging from 60 to 70 per minute, are illustrated in a 4-page publication put out by Pneumatic Scale Corp., Ltd., 72 Newport Ave., North Quincy 71, Mass.

Machine Bundling—Illustrations and specifications for two types of bundling units, which replace costly hand operations with speedy mechanical production, are presented in a 4-page folder issued by Package Machinery Co., Springfield 7, Mass.

Transwrap Packaging—Illustrations of the Transwrap package machine, which forms, fills and seals packages at speeds of 50 to 100 per minute, and pictures of the various types of packages formed, can be found in a 6-page folder put out by Stokes & Smith Co., 4901 Summerdale Ave., Philadelphia 24, Pa.

Wirebound-box Assembly—Designed to save time in the shipping room because they can be tacked on the walls, instruction charts which illustrate the simple steps necessary to assemble and close all types of wirebound boxes and crates are being distributed by General Box Co., 510 N. Dearborn St., Chicago.

CONTROL EQUIPMENT

Flow Meter—Applications of the Propeloflo meter, which totalizes flow in 2-in., or larger, main lines, are given in 4-page Bulletin 350 by Builders-Providence, Inc., Providence 1, R. I.

Rotameters—Catalog Section 50-A, a 16-page manual describing and illustrating rotameters with remote indicators, recorders, totalizers, automatic controllers and automatic proportioners, has been published by Fischer & Porter Co., Hatboro, Pa.

Temperature Control—More than 20 types of Thermoswitch for temperature regulation are described in a 44-page catalog put out by Fenwal, Inc., 200 Pleasant St., Ashland, Mass.

Testing Equipment—A 6-page booklet entitled "Calibration of Testing Equipment" outlines the purpose and mechanism of verification of testing equipment and includes a short description of proving rings used in calibrating compression equipment; published by Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, N. Y.

X-ray Unit—A complete self-contained industrial x-ray unit which provides a quick, accurate means for nondestructive examination of specimens for internal flaws, cracks or foreign matter, is described in a 4-page folder put out by North American Phi'ips Co., Inc., 100 E. 42nd St., New York 17.

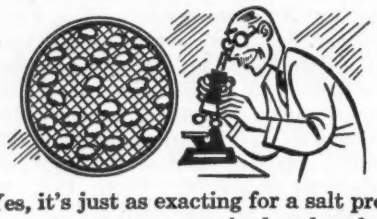
MISCELLANEOUS

Automatic Fly Control—The advantages and practical applications of the electric fly screen are listed in a 4-page manual published by Detjen Corp., 303 W. 42nd St., New York 18.

Sanitation—"Cleanliness and Health," a 4-page illustrated booklet for employers, industrial physicians and public health workers, describes in words and pictures methods for conserving health and promoting safety through proper cleanliness procedures; issued by Cleanliness Bureau of the Association of American Soap & Glycerine Producers, Inc., 11 W. 42nd St., New York 18.

WE KNOW what you're up against, trying to issue uniforms to a bunch of rookies! You don't mind the size 38 who wears size 9 shoes. But that big 6 ft. 7 in. bruiser who weighs 340—man, oh, man! Or the squirt who wears a 5½ shoe—they drive a guy to distraction!

And in the salt business we've got to "fit" the salt to the job. Butter makers don't want large, slow dissolving crystals in Butter Salt. We remove the "big ones" so completely, you won't find even a trace on a 28-mesh Tylor screen. But they don't want fine dust, either, to cause pasting in the churn. Diamond Crystal Butter Salt contains only 3% of particles small enough to pass through a 65-mesh screen!



Yes, it's just as exacting for a salt producer to remove over-sized and under-sized salt crystals . . . as for the "top kick" to take care of his over-sized and under-sized rookies. If we know the average "top kick," however, he gets results and so do we at Diamond Crystal. That's why you can be sure of clean screening whenever you specify Diamond Crystal. Take your choice of grade or grain—it's tops by actual tests!

NEED HELP? HERE IT IS!

If *you* have a salt problem, let our Director of Technical Service help! Just address him in care of Diamond Crystal Salt, Dept. J-2, St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS SALT

PATENTS

Vegetables, Fruits and Similar Foodstuffs Containing Less Than 20 Percent Dry Solids Dehydrated to Give Dry Content Between 70 and 90 Percent Preliminary to Pressing Into Briquettes Under Pressure Between 200 and 1,000 Kg. Per Square Centimeter—Aage Gernow, Copenhagen, Denmark, to Alien Property Custodian. No. 2,351,950. June 20, 1944.

Enzyme Activator Made to Consist of Soya Flour, Wheat Flour and Buffer Salt in Substantially Equal Parts—Herbert C. Gore and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,351,954. June 20, 1944.

Yeast Separated From Water Suspension by Centrifugal Action—Max Petrus Jozef Maria Jansen, Amsterdam, Netherlands, to Alien Property Custodian. No. 2,351,970. June 20, 1944.

Water Extract of Buckwheat Equivalent to 3 to 10 Percent of Dry Buckwheat Flour Added to Conventional Yeast and Wheat Flour Dough Mix—Friedrich von Viditz, Vienna, Germany, to Alien Property Custodian. No. 2,352,046. June 20, 1944.

Prunes Pitted, Soaked in Water Containing Colloidal Solution of Sulphur, Dehydrated and Ground Into Powder Within Temperature Range of 100 to 140 Deg. F.—Louis La Vine, Burbank, Calif. No. 2,352,108. June 20, 1944.

Fatty Portions of Animal Tissue Separated From Nonfatty Portions by Hashing and Flotation—Charles T. Walter, to Industrial Patents Corp., Chicago, Ill. No. 2,352,154. June 20, 1944.

Cheese Formed Into Thin Sheet on Rotating Drum, Cut Into Ribbon Strips, and Layered to Form Multi-ply Bar or Bricks of Cheese—Norman Kraft, Chicago, Ill., to Kraft Cheese Co. No. 2,352,210. June 27, 1944.

Dehydration Carried Out on Heated Drum Equipped to Simultaneously Cool and Remove Film at End of Drying Period—Glen Overton, Dowagiac, Mich., to Louisville Drying Machinery Co. No. 2,352,220. June 27, 1944.

Foam Prevented From Forming Upon Filtrate as Discharged From Filter—Frank W. Young, Upper Montclair, N. J. No. 2,352,304. June 27, 1944.

Grains Hulled in Unit Consisting of Combination Feeding Device, Rotatable Impeller, and Ring-shaped Member Surrounding Impeller to Give Inner Surface Adjustable Space Relation to Periphery of Impeller—Howard Clarence Kirn, Peterborough, Ontario, Canada, to Quaker Oats Co., Chicago, Ill. No. 2,352,327. June 27, 1944.

Edible Sheet Material Mechanically Shaped Into Tubular Form and Toasted—Edward D. Powers, Queenston, Ontario, and Albert M. Fennis, Niagara Falls, Ontario, Canada. No. 2,352,447. June 27, 1944.

Zein Solutions Made Directly from Gluten—Roy E. Coleman, Chicago, Ill., to Time, Inc. No. 2,352,604. July 4, 1944.

Meats Dipped Into Gelatine Bath Containing Uniform Concentration of Gelatine Solids and Having Viscosity of at Least 37 at Constant Predetermined Elevated Temperature—William W. Bowers, to Wilson & Co., Inc., Chicago, Ill. No. 2,352,611. July 4, 1944.

Elongated Strips of Dough on Conveyor Mechanically Shaped Into Coils With Free Edge Sealed Into Botton of Coil—Morris Cohen, Kansas City, Mo., and Duard W. Enoch, George Hasty and Gerald A. Jorgenson, Chicago, Ill., to Interstate Bakeries Corp., Kansas City, Mo. No. 2,352,617. July 4, 1944.

Starch-containing Cereal Material Cooked in Steam and Predried in Absence of Mechanical Pressure Until Moisture Content is Lowered About 50 Percent Preparatory to Cooling to About 10 Deg. C. for Grinding to Moist Powder in Preparation for Further Drying Under Moderate Heat and Vacuum With Vigorous Agitation.—Zelmanas Volpertas, New York, N. Y. No. 2,352,670. July 4, 1944.

Confections Coated With Chocolate and Similar Covering Material in Mechanical Unit Constructed to Feed Tempered Coating in Continuous Stream on Endless Belt Through Coating Zone With Provision for Return of Excess Coating to Central Source for Retempering and Rediscbarge Onto Conveyor.—Edward C. Johnston, Nevin J. Russel and Robert M. Jameson, to Robert A. Johnston Co., Milwaukee, Wis. No. 2,352,839. July 4, 1944.

Substantially Odorless and Tasteless Fat-soluble Vitamin-containing Materials Prepared From Substances Having Objectionable Taste and Odors by Treatment With Vapors From Vegetable Meal Heated Between 100 and 200 Deg. C. Under Not More Than 20-mm. Pressure—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,353,011. July 4, 1944.

Sugar Sirup, Containing Pieces of Fruit, Thickened by Use of Algin—Victor Charles Emile Le Gloahec, Rockland, Me., to Algin Corp. of America, New York, N. Y. No. 2,353,251. July 11, 1944.

Icing for Hard Surface Chocolate Product Made To Consist of Sugar, Water and Small Percentage of Soybean Proteins—Julian A. Joffe, Mount Vernon, N. Y. No. 2,353,307. July 11, 1944.

Hard Surface Chocolate Product Coated With Cooled Icing Containing Soya Protein—Sarah F. Joffe and Julian A. Joffe, Mount Vernon, N. Y. No. 2,353,308. July 11, 1944.

Outer Surface of Ripened Banana Treated With Acid Solution To Penetrate Core of Banana Without Altering Pulp Consistency Preliminary to Being Dried to Desired Firmness—Samuel B. Harris, Cristobal, Canal Zone. No. 2,353,333. July 11, 1944.

Fish Mechanically Dressed and Decapitated—Paul Danielsson, Stockholm, Sweden, to Arenco Aktiebolag. No. 2,353,654. July 18, 1944.

Citric Acid Produced by *Aspergillus niger* Fermentation—Joseph Szucs, New York, N. Y. No. 2,353,771. July 18, 1944.

Sugar Juice Solution Heat Treated, Concentrated and Filtered Under Predetermined Controllable Conditions for Constant Period of Time—Gustave T. Reich, Philadelphia, Pa. No. 2,353,784. July 18, 1944.

Smoked Salmon Meat and Canned Salmon Meat Ground Together in Ratio To Produce Homogeneous Plastic Mass—Frank E. Parker, Duluth, Minn., to Hanson Fish Products Co., Minneapolis, Minn. No. 2,353,924. July 18, 1944.

Chewing Gum Base Made To Consist of Monohydric Esters of Rosin Acids, Unsaturated Terpenes and Wax Modifier or Softener—Oscar A. Pickett, Newark, Del., to Hercules Powder Co., Wilmington, Del. No. 2,353,927. July 18, 1944.

Curd Tension of Milk Reduced by Action of Small Amount of Pancreatic Enzyme—Arnold B. Storrs, Torrington, Conn., to American Seal-Kap Corp., Wilmington, Del. No. 2,353,946. July 18, 1944.

Fresh Fruit Juices Preserved by Addition of 1 Percent by Volume of Propylene Oxide Immediately Prior to Sealing in Airtight Container—Edward C. Haines, Morrestown, N. J. No. 2,354,014. July 18, 1944.

Beer or Ale Hopped in Second Stage Brew Kettle Equipped With Reflux Condenser—Berthold Stein, Brooklyn, N. Y. Nos. 2,354,092 and 2,354,093. July 18, 1944.

Legumes Preheated in Presence of Moisture To Soften Without Affecting Solid State or Rupturing Cells Preparatory to Dehydrating by Passage Between Rolls Under Pressure at 400 to 600 Deg. F.—Charles A. Krause, Jr., Fox Point, Wis. Reissue No. 22,522. July 25, 1944.

Bakers' Yeast Grown in Nutrient Medium Containing Molasses, Carbohydrate, Nutrient Inorganic Salt and Methyl Thiazole—Alfred S. Schultz and Lawrence Atkin, Bronx and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,354,281. July 25, 1944.

Solid Foods Dehydrated by Heating in Bath of Molten, Partially Saturated Ester of Aliphatic Polyhydric Alcohol and Aliphatic Monocarboxylic Acid—Paul H. Bodenstein, to Joseph Halmowitz and Joseph D. Shifrin, New York, N. Y. No. 2,354,495. July 25, 1944.

Residual Frozen Fruit or Vegetable Juice Concentrate Recovered From Ice Mass After Main Separation by Centrifuging, Pressing and Draining—Frederick W. Bedford, to Bedford Products, Dunkirk, N. Y. No. 2,354,633. July 25, 1944.

Dextrose Converted to Levulose—Sidney M. Cantor, Riverside and Kenneth C. Hobbs, Berwyn, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,354,664. Aug. 1, 1944.

Cinnamon Buns Made by Mechanical Means—William C. Grimm and Richard H. Linneman, to Cinnamon Bun Machine Co., Inc., Jersey City, N. J. No. 2,354,681. Aug. 1, 1944.

Canadian Patents

Dry Casein Solubility in Water Increased by Addition of Neutral Soluble Salts of Phthalic Acid, Substituted Derivatives of Phthalic Acid and Phthalimide and Substituted Derivatives of Phthalimide, Naphthalic Acid, Maleic Acid, Succinic Acid and Succinimide—Edward F. Christopher, Chicago, Ill., to Industrial Patents Corp. No. 421,131. June 27, 1944.

Vitamin B_1 Oxidized by Mild Agent Effective in Presence of Aqueous Alkali—Otto Zima, Darmstadt, Germany. No. 421,594. July 18, 1944.

Bottled Beer Pasteurized in Continuous Manner While Traveling Through Preheating, Pasteurizing, Holding and Cooling Zones on Endless Conveyor—James Lilburn Herold, St. Louis, Mo., William John Nekola, South Pasadena, Calif. and Frederick Widmann Wehmiller, Ladue, Mo., to Barry-Wehmiller Machinery Co., St. Louis, Mo. No. 421,628. July 25, 1944.

ENEMY ALIEN PATENTS

Patents Granted

Milk Fermented in Unit Consisting of Heat Interchanger, Insulating Container and Bacteria Carrier—Heinrich Paul Thies. No. 2,162,449. June 13, 1939. (Sec. 18l.)

Whey Fermented To Produce Butanol and Acetone—Alfred Frey, Hans Gluck and Hermann Oehme. No. 2,166,047. July 11, 1939. (Sec. 19a.)

Seeds and Nuts Containing Substantial Quantities of Oil Soaked in Weak Acid Solution Preparatory to Pressing by Passage Between Hot Rolls To Flake and Roast Without Scorching—Martin Cohn. No. 2,172,699. Sept. 12, 1939. (Sec. 18i.)

Milk, Beer, Cider, Lemonade and Like Sterilized by Heat Treatment Under Pressure While Passing Through Three Continuous Heating Tubes—Leonardus de Jonge (Syndicate Jozijdhoff). No. 2,173,411. Sept. 19, 1939. (Sec. 18n.)

Meats Cured Rapidly Preparatory to Smoking by Injecting Curing Solution With Repeated Piercings With Hollow Needles—August Nietiedt. No. 2,180,165. Nov. 14, 1939. (Sec. 18n.)

Disagreeable Flavor of Decaffeinized Tea Minimized by Treatment To Recombine the Liberated Tannin—Theodor Grethe. No. 2,181,549. Nov. 28, 1939. (Sec. 18c.)

Lactose in Cheese Whey Fermented by Yeast To Convert 65 Percent to Alcohol—Willem Kauffmann and Pieter Johannis van der Lee. No. 2,183,141. Dec. 12, 1939. (Sec. 19a.)

Carbohydrates Hydrolyzed to pH 2.3 to 3.0 at 150 to 160 deg. C. Under Increased Pressures To Minimize Discoloration of Resulting Sirup—Waldemar Kroner and Heinz Kothe. No. 2,186,075. Jan. 9, 1940. (Sec. 18q.)

Baking Yeast Subjected to Systematic Osmosis, Plasmolysis and Autolysis With Simultaneous Use of Sugar and Salt Without Killing Yeast Cell But Retarding Its Fermentation Properties and Prolonging Its Duration of Activity—Jean Christian Matti (Compagnie Internationale de Procedes de Panification "Itam.") No. 2,187,357. Jan. 16, 1940. (Sec. 19e.)

Molasses for Yeast Nutrient Use Purified by Diluting With Water With or Without Defecation Followed by Centrifuging—Peter Steinacker. No. 2,187,990. Jan. 23, 1940. (Sec. 19a.)

Hop Extracted by Alcohol or Ether in CO_2 Atmosphere—Louis Anton Freiherr von Horst. No. 2,191,838. Feb. 27, 1940. (Sec. 18g.)

Flavor of Milk and Other Liquid or Semi-liquid Foods Improved by Aeration With Oxygen to Remove Other Gases and To Destroy Bacteria at Relatively Low Temperature—Karl Richter (Metra Maatschappij voor Verduurzaming van Zuivelproducten N. V.). No. 2,195,469. April 2, 1940. (Sec. 18n.)

Shortening of Water-in-oil-dispersion Type Made Stable Against Pressure, Freezing and Leakage During Long Storage—Herbert Schou. No. 2,220,976. Nov. 12, 1940. (Sec. 18m.)

Vegetable Extracts and Iron-containing Waters Clarified by Use of Carbonaceous Colloids in Combination With Lime or Alumina—Pieter Smit (N. V. Octroolen Maatschappij "Activit"). No. 2,221,683. Nov. 12, 1940. (Sec. 18q.)

Eggs and Fresh Fruit Deterioration Inhibited by Coating With Solid Aqueous Emulsion of Paraffin Wax, Liquid Paraffin, Ethyl and Propyl p-Hydroxybenzoates and Octadecyl Alcohol—Erich Kurt Julius Schmidt. No. 2,222,000. Nov. 19, 1940. (Sec. 18f.)

Beer Made To Contain Less Than 15 G. of Sugar Per Liter—Hans Distler (Paul Josef Winter). No. 2,223,444. Dec. 3, 1940. (Sec. 18c.)

Sugar Treated With Potassium Phosphate Solution Sufficient To Moisten But Insufficient To Dissolve; Has High Basic Value Without Being Hygroscopic—Volkmar Klopfer. No. 2,243,381. May 27, 1941. (Sec. 18q.)

Liquids Sterilized While Flowing Between Closely Spaced Surfaces of Two or More Different Metals Heated to Produce Thermal Vibrations of High Frequency—Wincenty Matxka. No. 2,243,761. May 27, 1941. (Sec. 18c.)

Fruit and Vegetable Juices and Milk Concentrated by Freezing With Subsequent Surface Evaporation of Concentrate Using Current of Gas at Temperature Below Boiling Point of Concentrate—Georg A. Krause (Gesellschaft fur Line's Eismaschinen A.-G.—One-half Interest). No. 2,248,634. July 8, 1941. (Sec. 18n.)

Cold Gelatinizing, Nonhygroscopic, Nonlumpy Starch Pudding Powder Made Without Use of Organic Precipitants—Georg Frischmuth and Engelbert Frobel (Deutsche Maizena Gesellschaft m. b. H.). No. 2,257,599. Sept. 30, 1941. (Sec. 18h.)

Sugar Continuously Crystallized From Solution, Starting With Small Fine Crystals—Johannes Anthonius Platte and Gerbertus Hendrik de Vries. No. 2,263,704. Nov. 25, 1941. (Sec. 18q.)

Meats and Like To Be Smoked Subjected to Vacuum at Beginning of Smoking Treatment and Air Gradually Admitted Until Atmospheric Pressure Is Reached—Christian Thon. No. 2,266,131. Dec. 16, 1941. (Sec. 18n.)

Cleaned Fish Ground, Heated to 60 to 100 Deg. C., Shaped Into Strips, Granules or Lumps and Dried at 20 Deg. C.—Hjalmar Minde (Eirik Heen, One-half Interest). No. 2,271,272. Jan. 27, 1942. (Sec. 18o.)

Artificial Sausage Casings of Improved Quality Made by Impregnating Artificial Textile Fiber Fleeces With Film-forming Substances—Otto Schnecko. No. 2,289,049. July 7, 1942. (Sec. 18t.)

Bleaching of Flour Controlled Through Mechanical Control Over the Generation of Nitrogen Trichloride—Adrianus Kleijn. No. 2,289,436. July 14, 1942. (Sec. 18h.)

Blowing of Cheese During Ripening and Storage Minimized by Addition of 0.005 to 0.05 Percent of Soluble Bromate or Iodate—Helger Jorgensen (A./S. Dansk Gaerings-Industri). No. 2,291,632. (Aug. 4, 1942. (Sec. 18l.)

Shrimp Meat Concentrated to 30 to 40 Percent of Original Water Content by Boiling in Salt Water or Freezing for Removal of Waste; Retains Nutritive Qualities and Keeps Well If Dried—Wolfgang Henning. No. 2,297,411. Sept. 29, 1942. (Sec. 18t.)

Fish, Meat and Like Preserved for Five Days or Longer by Treatment With Hydrogen Peroxide Solution Adjusted to pH 3 to 5 With Lactic Acid—Rudolf Thilenius. No. 2,297,441. Sept. 29, 1942. (Sec. 18n.)

Dried Peas Treated With Alkali Citrates to Improve Cooking Properties—Willi Rudolph. No. 2,297,502. Sept. 29, 1942. (Sec. 18n.)

Flour Treated With Levo-ascorbic Acid, Ascorbates and Isoascorbates Stabilized by Addition of Nonhygroscopic Material Such as Magnesium Carbonate—Gerrit van der Lee. No. 2,300,439. Nov. 3, 1942. (Sec. 18h.)

Sugar Sirups Decolorized and Purified by Addition of 0.01 Percent Powdered Metals or Their Alloys—Walter Robert Aehnelt. No. 2,305,657. Dec. 22, 1942. (Sec. 18q.)

Rope in Bread Inhibited by Use of Calcium Acetate—Anton Iglauer. No. 2,305,826. Dec. 22, 1942. (Sec. 18b.)

Patent Applications

Inedible Fats and Oils Made Edible by Removing Proteins and Undigestible Constituents and Breaking Down Into Fatty Acids and Glycerol—Arthur Imhausen. No. APC 362,683. Filed Oct. 24, 1940. (Sec. 18m.)

Edible Fats Synthesized From Petroleum Paraffins From Which Aromatics Have Been Removed—Arthur Imhausen. No. APC 362,684. Filed Oct. 24, 1940. (Sec. 18m.)

Milk Sterilized Without Heating by Aerating With Ozone—Jules Doms. No. APC 369,359. Filed Dec. 9, 1940. (Sec. 18l.)

Yeast Activity in Bakers' Mixes Increased by Addition of Nondiastatic Water Extract From Buckwheat—Friedrich von Viditz. No. APC 389,746. Filed April 22, 1941. (Sec. 18b.)

Shellfish Treated To Recover Provitamin D, Leaving Shellfish Suitable for Human Consumption—Engbert Harmen Reerink, Jan Boeke and Willem Stevens. No. APC 390,422. Filed April 25, 1941. (Sec. 18r.)

Precooked Vegetables Subjected to Pressure Heating To Cause Partial Disintegration Preparatory to Drying—Balant Moskovits. No. APC 394,221. Filed May 19, 1941. (Sec. 18m.)

Fish Paste Prepared From Unboned Fish by Cooking in Live Steam With 5 Percent Salt and Up to 10 Percent Vinegar Preliminary To Grinding in Rotary Mill, Packaging in Sausage Casings and Smoking—Eibert den Herder. No. APC 404,619. Filed July 30, 1941. (Sec. 18t.)

Artificial Sausage Casings Improved by Impregnating With Meat Fibers—Julius Wolff. No. APC 421,393. Filed Dec. 2, 1941. (Sec. 18t.)

Fruits and Vegetables Dried and Compressed Into Briquets Having Apparent Specific Gravity of 1.1 to 1.2 or Higher—Aage Gernow. No. APC 439,293. Filed April 16, 1942. (Sec. 18n.)

Peanut Oil Phosphatides Effectively Recovered by Use of Small Quantities of Alcohols and Ketones—Aage Christiansen. No. APC 322,481. Filed April 20, 1943. (Sec. 20a-2.)

BOOKS

Official Confusion

BUREAUCRACY RUNS AMUCK. By Lawrence Sullivan. Published by The Bobbs-Merrill Company, 468 Fourth Ave., New York, N. Y., 1944. 318 pages; 5½x8¼ in.; cloth. Price, $2.

If you have spent time and effort trying to learn what was behind many of the orders eminating from Washington since food control went into effect, this book might provide a partial answer. More important, however, is the airing of the tremendous bureaucratic structure that has grown, perhaps to truly dangerous proportions, under the stimulus of wartime in Washington.

The book quite frankly has an axe to grind, and the sparks sometimes get in the thoughtful readers way. The author at times seems almost to assume that the transition from peace to war could have been accomplished without some confusion. On the other hand, the picture of this confusion is authentic, particularly where it concerns food, and it presents a mass of information that is not readily available elsewhere.

Process Equipment

CHEMICAL MACHINERY. By Emil Raymond Reigel. Published by Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. 1944. 583 pages; 6¼x9¼ in.; cloth. Price, $5.00.

Here is a collection of useful information on apparatus and devices used in the chemical processing industries, many of which have application in food plants. In order to bring the material within the practical limits of a single volume, preference is given to the devices that serve a number of diverse chemical processes and thus have general application. The devices are also of a type that may be purchased from a manufacturer and that serve large scale operations. Laboratory equipment and home devices are not included.

Primarily descriptive, the text is liberally supplemented with drawings and photographs. Whenever possible, however, the reasoning governing the conception of the device, its operation, and the determination of size for an intended service are supplied.

The author has been permitted to quote costs of many of the devices so that the reader is able to compute the approximate cost of an installation. While these price quotations are subject to fluctuation, they should provide a reasonably close overall cost estimate.

Nutrition Data

HANDBOOK OF NUTRITION Published by the American Medical Association, 535 North Dearborn St., Chicago 10, Ill., 1943. 586 pages; 5½x8½ in.; paper. Price, $2.50.

With the trend toward higher standards of nutrition still very much on the upgrade, this compilation of articles, taken from the *Journal of the American Medical Association*, should serve as a helpful reference to all those engaged in food manufacture.

The articles are directed, of course, to the medical practititioner, but the text is never so technical as to become a burden to anyone at all interested in the subject. One article in particular, "The Preservation of the Nutritive Value of Foods in Processing," offers a summary of the vitamin loss in processing—freezing, canning and dehydrating—that should be a valuable addition to the food manufacturer's library.

Microbiology Treatise

MICROBIOLOGY OF FOODS. By Fred Wilbur Tanner. Published by Garrard Press, Champaign, Ill., 1944. 1196 pages; 6½x9½ in.; cloth. Price, $12.50.

The notable development in every phase of the food industry since the publication of the first edition of this book in 1932 has led to this second, and completely rewritten, edition. It embraces the major methods of analysis that have been issued up to the time of publication, including the official methods developed in the United States and Great Britain.

As a source book to the literature as well as to the methods of analysis, much of the recent literature has been reviewed, and these references are all listed. An entirely new chapter on the microbiological assays of foods for vitamins also has been added.

Because microbiology has played a major role in food preservation, and particularly in the advances made during the past 12 years, this new edition should find its way to the shelf of well-thumbed books in both the office and the laboratory of most food processors.

Consumption Compared

FOOD CONSUMPTION LEVELS IN THE UNITED STATES, CANADA AND THE UNITED KINGDOM. Report of a special joint committee set up by the Combined Food Board. Issued by U. S. Department of Agriculture, April, 1944. 121 pages; 6x9 in.; paper. For sale by Superintendent of Documents, Washington 25, D. C. Price, 20 cents.

As a preliminary to combining the food resources of the United States, Canada and the United Kingdom, an investigation into the consumption levels of the three countries was made. This report is the result. It reveals that the food supplies reaching the average British citizen are less than those available to the average U. S. or Canadian citizen. The report not only compares practically every item of food but reveals how the studies were made, thus presenting a procedure which may prove to be of value in future market studies.

Tea Control

TEA UNDER INTERNATIONAL REGULATION. By V. D. Wickizer. Published by Food Research Institute, Stanford University, Calif., 1944. 198 pages; 6¼x9¼ in.; cloth. Price, $2.50.

Of all the common beverages, tea is the cheapest, yet it is surpassed in commercial importance today only by coffee. This book attempts an impartial appraisal of the world tea industry under the international tea regulation scheme formulated among the producers' associations in India, Ceylon and the Netherlands Indies in 1932. It analyzes developments before and after control and explores the thesis that postwar commodity problems can be dealt with effectively under international agreements.

A grant from the Rockefeller Foundation made possible the investigations upon which the book is based, and the work was carried on under the guidance of the director of the Food Research Institute.

Biochemistry Review

ANNUAL REVIEW OF BIOCHEMISTRY. Edited by James Murray Luck. Published by Annual Reviews, Inc., Stanford University P. O., Calif., 1944. 795 pages; 6¼x9 in.; cloth. Price, $5.00.

Though the publication of the 13th volume of this annual review was delayed because of wartime conditions, its appearance will undoubtedly evoke the same welcome that its predecessors enjoyed. No attempt can be made here to evaluate the 26 papers appearing in the review except to say that most of them reveal developments that are of importance to the food chemist and the food technologist.

Data on Packaging

PACKAGING CATALOG. Published by The Packaging Catalog Corp., 122 East 42nd St., New York, N. Y., 1944. 766 pages; 8½x11¾ in.; leatherette. Price, $2.50.

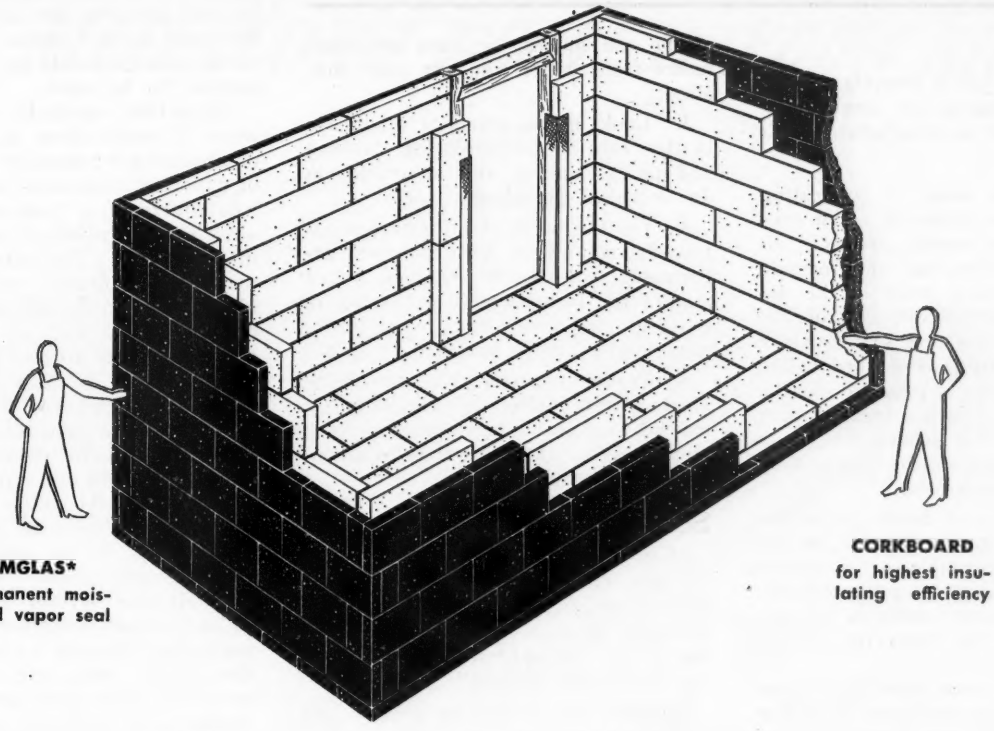
This annual catalog is keyed, this year, to the theme of reconversion. The entire first section is devoted to the subject and features an article by a WPB official, outlining a timetable for the reconversion of various materials to peacetime uses.

An effort has been made to consolidate the wartime progress in packaging, including the many new uses of paper, the new protective wrappings and coatings, and the new shipping packages and devices.

Handling Paper Bags

HANDLING AND STORAGE OF PAPER SHIPPING SACKS. Published by Manufacturing Chemists Association of the U. S., 608 Woodward Bldg., Washington 5, D.C., 1944. 6 pages; 8¼x11¾ in. Price, 15 cents.

This little manual recommends the best methods for handling and storing paper shipping sacks. It is a practical guide for both shippers and consignees. The recommended practices are illustrated by pictures.



For permanently efficient low-temperature protection

Armstrong Offers a New Insulation Construction

ARMSTRONG has developed a new type of low-temperature insulation construction that combines Armstrong's Corkboard with Foamglas* and takes advantage of the best properties of both materials. This new construction furnishes a positive, permanent seal against infiltration of moisture and vapor—thus assuring permanently high insulating efficiency.

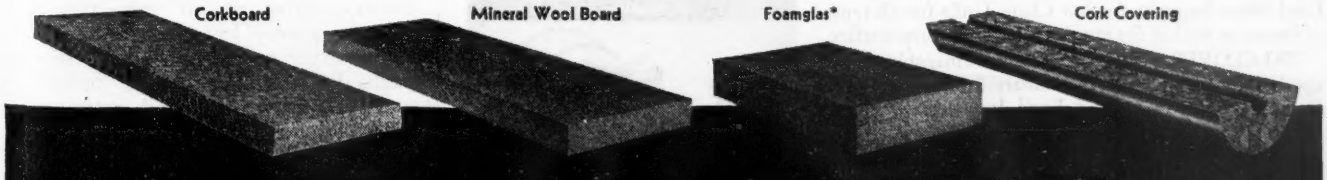
Since it is basically standard corkboard construction, the new combination retains corkboard's natural moisture resistance and exceptionally low thermal conductivity. This assures high efficiency for heavy-duty work.

However, the outer shell is Foamglas—to seal out all moisture. The material is glass in cellular form, with each tiny cell wholly isolated from the others. Hence, Foamglas is moistureproof, vaporproof, and fireproof.

The new construction is easy to erect since both materials are erected in accordance with standard specifications. Interior wall finishes are the same as for standard corkboard construction.

FOR COMPLETE INFORMATION about the new combination construction—including engineering drawings and erection specifications—write today to Armstrong Cork Co., Building Materials Division, 4209 Concord Street, Lancaster, Pennsylvania.

*Reg. U. S. Pat. Off. Product Mfg. by Pittsburgh Corning Corp.



ARMSTRONG CORK COMPANY

Insulation Ⓐ Headquarters

Questions & Answers

Formulas

Maine—"Have you a formula for the making and packaging of corn relish? We are interested in manufacturing this product."

Formulas have value in suggesting new products for research, or in suggesting ways to modify products already in production, but any formula is merely a starting point in the development of a satisfactory commercial product. And in the case of a mixture such as corn relish, where processing and packing methods play so great a part in the final result, a formula may be misleading. We believe that more satisfactory results will be obtained by the following procedure.

1. Obtain a good home recipe developed or used in your district, or one which will be acceptable in the market you intend to reach. Good cookbooks should be in every canner's library. This gives you the basis for texture and flavor.

2. Write to your state agriculture experiment station, and also the Office of Information, U. S. Department of Agriculture, Washington, D. C., for any publications which they have in the field in which you are interested. Also consult the service departments of the can makers or glass manufacturers from which you get your supplies.

3. Look up the standard practice—in this case in textbooks on canning and pickle making and in articles in the technical periodicals.

4. On the basis of information obtained from all of these sources, experiment on small batches, then modify the formula and processing to conform to your equipment, price range and available materials.

5. Provide yourself with sound technical advice, either by employing a trained food technologist on your own staff or by using the services of a consulting laboratory.

Soluble Coffee

Haiti—"We take the liberty of writing you for information regarding the production of soluble coffee; first the technical process for its manufacture and second the apparatus necessary for an average-size factory."

Soluble coffee may be sold in the form of a liquid concentrate or as dry crystals. In most cases the product contains carbohydrate material to aid in retaining the flavor.

The beans are roasted, ground and extracted, then the extract is filtered or clarified, concentrated and dried if desired. The selection, blending, roasting and grinding are done just as for the usual market coffee. The fineness of the grind depends on the extraction method to be used.

Extraction methods vary. When water is used there is the problem of obtaining a relatively small amount of flavoring substances in concentrated solution from a powder which will absorb 160 percent of its own weight of the solvent. The extraction may be made in a drum, with subsequent filtering, or by percolation through the coffee powder. Various mechanical arrangements are used to get more complete recovery of the desired flavoring elements without too much bitterness or oil. These generally embody the idea of water circulation at controlled temperature and pressure through beds or columns of the coffee.

Solvents other than water may be used, alone or in combination with a water extraction. Some patented methods use several recovery steps. In one, vapors from the roasted beans are passed through a paraffin oil, then the ground beans are extracted with petroleum ether, with alcohol and with water. The solvents in all cases are evaporated off and the residues combined. Various other combinations of extracting solvents have been used.

To aid in drying or to give a heavier concentrate, sugars such as dextrose may be added. The use for the purpose of tasteless and odorless carbohydrates recovered from the coffee grounds has been patented.

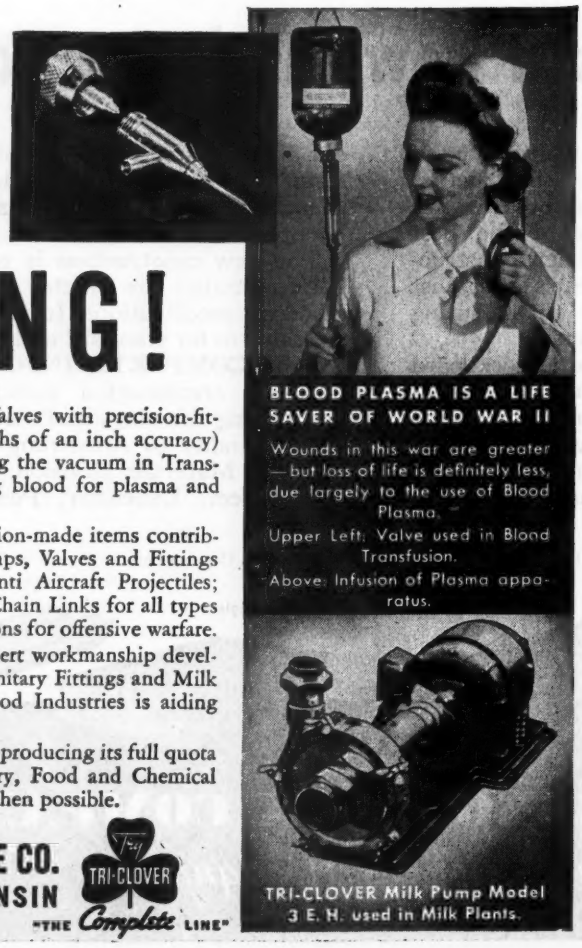
The extracts usually need to be filtered and then are clarified. Centrifuging is recommended to remove the very fine coffee particles.

Concentration and solvent evaporation are carried out under vacuum, at as low a temperature as possible so as to retain the aromatic materials. When water is used as solvent, the solution may be concentrated by freezing. Spray drying is best.

After manufacture, the dried product must be kept in a moisture vaporproof container until used, and preferably in individual portions.

The equipment required depends on the size of the operation, the degree of mechanization desirable and the process selected. The minimum plant would have a roaster capable of delivering a uniform product, weighing devices, grinders, an extraction apparatus, a very low-pressure evaporator, a dryer and a quick and efficient packaging line, with the operating pumps, control valves and instruments.

Recent U. S. patents covering methods for making soluble coffees include 2,324,526, issued July 20, 1943, to Max R. Morgenthaler and assigned to Inredeco, Inc., Panama City, Panama; 2,306,061, issued December 22, 1942, to W. R. Johnston and assigned to Standard Brands, Inc.; and 2,350,903, issued June 6, 1944, to J. L. Kellogg.



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BLOOD PLASMA IS A LIFE SAVER OF WORLD WAR II

Wounds in this war are greater—but loss of life is definitely less, due largely to the use of Blood Plasma.

Upper Left: Valve used in Blood Transfusion.

Above: Infusion of Plasma apparatus.

TRI-CLOVER Milk Pump Model 3 E. H. used in Milk Plants.

TRI-CLOVER Transfusion Valves with precision-fitting parts (two ten-thousandths of an inch accuracy) control blood flow by holding the vacuum in Transfuso-Vac Bottles in collecting blood for plasma and for transfusion.

Other TRI-CLOVER precision-made items contributing to saving lives are Pumps, Valves and Fittings for Penicillin and Serum; Anti Aircraft Projectiles; Land Mine Strikers; Anchor Chain Links for all types of boats; as well as for munitions for offensive warfare.

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"THE Complete LINE"

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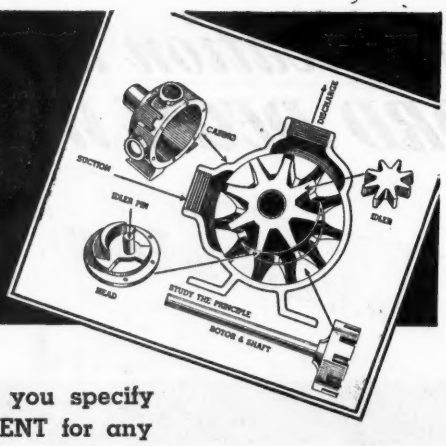
MEMO:

To Engineers and Purchasing Agents



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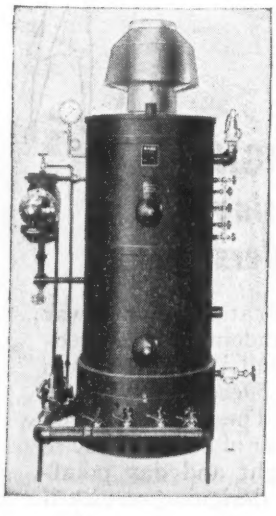

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Manufacturers of Automatic Steam Boilers for over a third of a century.
1903-1915 EAST HAGERT STREET, PHILADELPHIA

Reveals New Facts

(*Continued from page* 71)

sistency and other properties of imported cocoa butter. The new fat is, in most of its properties, very similar to cocoa butter, and other genuine plant-fat butters. Development of suitable commercial processing equipment should make possible the annual production of more than 50 million pounds of substitute fat.

The similar combination of controlled hydrogenation and solvent fractionation was also applied to peanut oil to produce a replacement for olive oil in the textile industry. The product has been tested commercially and seems satisfactory.

Tangerine Sirup—In Florida, as many as a million boxes of tangerines have been wasted annually because of size and grade restrictions. It is possible to combine the recovery of flavoring oil and cattle feed with the manufacture of two types of vacuum-concentrated by-products which have high food value as well as excellent flavor and keeping quality. A bland sirup can be made from tangerine juice with the retention of 75 percent of the original vitamin C content. This sirup can be stored at tropical temperatures without deterioration, which makes it suitable for use where citrus juices or concentrates cannot be provided easily in good condition. A tangerine beverage base concentrate can be used like other citrus concentrates in carbonated beverages and food products where the fruit flavor, minerals and vitamin C content make it desirable.

Preserving Marmalade Stock—Several methods are in use for reducing the moisture content of marmalade stock as a means of reducing the shipping facilities required for handling the product. One method consists of packing the sliced peel with sulphur dioxide in barrels, concentrating the juice to 65 percent soluble solids and preserving it separately with sulphur dioxide in barrels. When the peel and concentrate are combined with sugar and water and boiled in manufacturing marmalade, the sulphur dioxide is substantially removed, and the resulting marmalade is considered equal in quality to that made from fresh marmalade stock.

Ion Exchange Improves Pectin—To produce a good-quality pectin by either the spray or the drum drying method, it is necessary to reduce the content of minerals naturally present in pectin extracts and also the removal of lead and arsenic spray

1 Olco
Chemi
1936.

contaminants when apple pomace is used as the source of pectin. It appears possible to accomplish these purposes by filtering the pectin extracts through materials having ion-exchange properties. The metal radicals, such as the lead, calcium and magnesium, are removed by cation-exchange materials. Removal of the acid radicals, such as the arsenic, can be accomplished by an anion-exchange material.

Refining Fats and Oils

(*Continued from page 92*)

animal fats will improve stability towards rancidity.

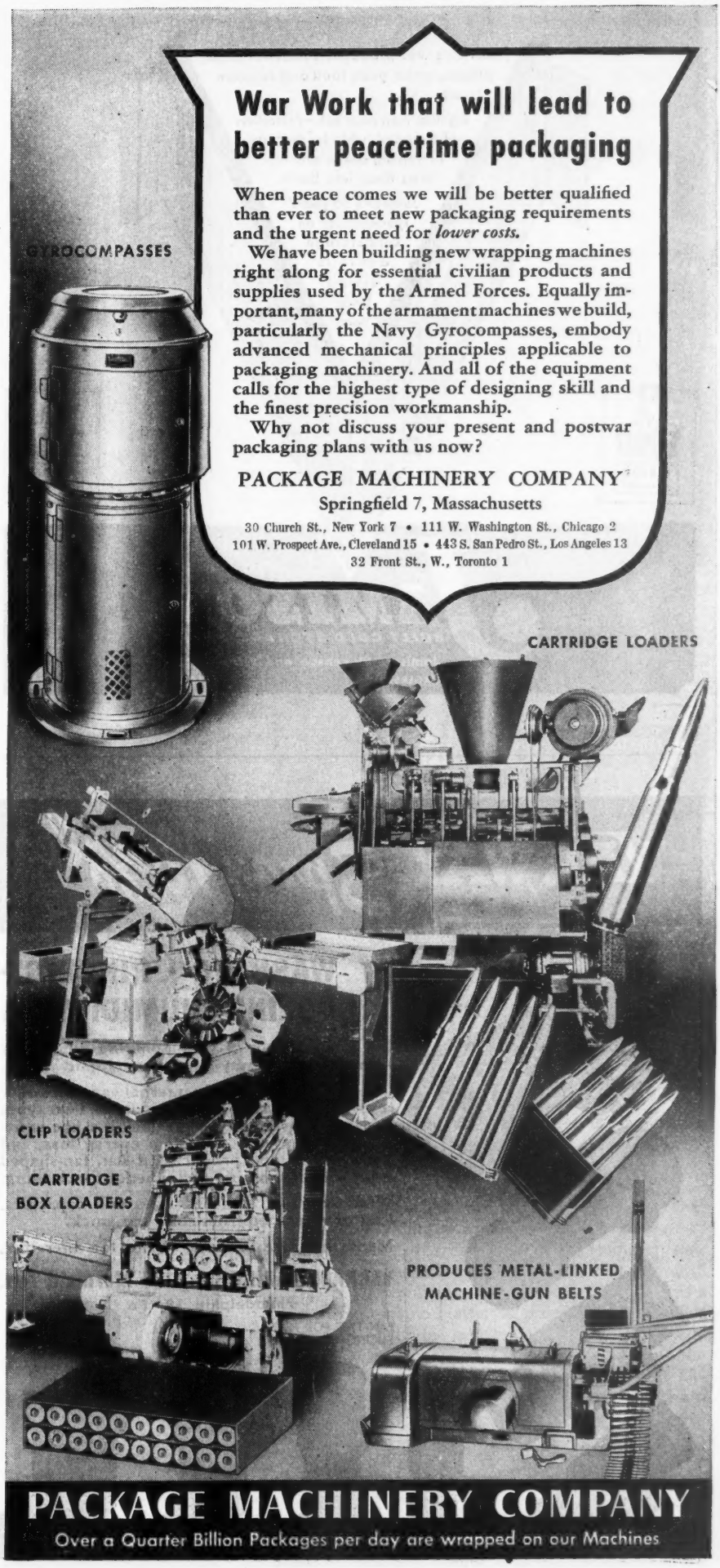
The existence of antirancidity substances in natural oils can be demonstrated by comparing the rate of rancidification of a natural oil with that of the isolated glycerides of the fatty acids hydrolyzed from the natural oil (the glycerides being formed by esterification of the acids with glycerol). The isolated glycerides are much more sensitive to rancidity than the natural oils. The character of the naturally occurring antirancidity substance is easier to understand when one realizes that phosphatides, lecithin and vitamins A and E possess outstanding antirancidity effects. Unsaponifiable fatty substances in the oil of the germ of wheat and of corn and in certain other vegetable oils, such as palm and cottonseed, also possess this valuable antirancidity effect.[1] Even vegetable proteins—the natural components of all oil seeds and fruits—show the properties to a lesser degree.

It is of some interest to know that the concentrate of the unsaponifiable constituents of vegetable oils produced by Olcott and Mattil, the so-called "inhibitols," have an especially beneficial effect on animal fats, such as lard. On the other hand, these do not have the least effect on vegetable oils, such as cottonseed oil.

It must be pointed out further that wheat germ and similar germ oils possess antirancidity properties of their own. Ground oil seeds and ground corn also possess this property to a certain degree. The antirancidity effect of protein and ground cereals is applicable only for the stabilization of raw fats and oils if they have been stored for a long time before refining. The comparable effect of lecithin and carotene still is under study.

One must not forget that the natural pigment of vegetable oils (ex-

[1] Olcott and Mattil, *Journal of American Chemical Society*, vol. 58, 1627-30; 2204-08, 1936.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cluding the dark color arising from overheating during the pressing and extracting operations) also influences rancidity development. Experience has shown that rancid oil frequently possesses a much lighter color than when it is not rancid. This observation has been made in the case of olive oil in glass bottles especially. The green color probably acts as a physical obstruction to the ultraviolet and likely possesses a chemical structure that in itself is an antioxidant. If the pigment is removed by strong bleaching with earth and carbon, an oil is obtained which is considerably more susceptible to rancidity than the original.

There are certain antirancidity agents which are "non-natural" in the sense that they do not occur in nature with the vegetable oil. These include maleic acid[2] and water-soluble substances which have been tested and classified by C. H. Lea.[3] Some points in Lea's classification are cited:

1. Aliphatic polyhydroxy compounds, such as glycerol and sugar, are antirancidity agents with merely a slight effect.

2. Aliphatic monobasic hydroxy acids, such as lactic or blycolic (hydroxy-acetic) acids and ethanolamines, are slightly more effective as antirancidity agents.

3. Hydroxy acids, such as tartaric, citric and malic acids, have the strongest antirancidity properties.

Limitations on Refining

Taking all the facts into consideration, the conclusion may be drawn that a really good refining treatment demands the preservation of the vitamins and the natural antirancidity constituents, and the removal of only those impurities of a definitely undesirable nature. Such an ideal refining method is, however, applicable only to fresh, not rancid, raw oil produced by careful pressing or extracting of fresh seed or fruit.

Care must be taken that, during pressing, the product shall not be injured or maltreated by overheating. Oils carefully obtained from fresh seed or fruit sometimes need only neutralization to retain their original color and flavor. Oil of this quality easily can be recognized as high grade by its fine flavor, which should characterize the seed or fruit of its origin.

The demand for colorless oils—in some countries, flavorless oils are wanted—is the reason that highly refined oils, without vitamins or natural antirancidity constituents, are

[2] Greenbank, *Science*, No. 1991, 1933.
[3] "Rancidity in Vegetable Oils," London, His Majesty's Stationery Office, 1938.

very frequently produced. By removal of increasingly higher percentages of impurities and constituents resulting from rancidity, highly refined oils are also deprived of very valuable properties at the same time.

For that reason, one should recognize two categories of edible oils: (1) Slightly refined fresh oils (some cold-pressed olive oils may even remain completely unrefined and are marketed as "virgin" oils). (2) Oils, highly refined, for which all phases of the refining treatment must be strictly applied.

If those two classifications are carefully kept in mind, one can easily identify, when analyzing or merely testing the oils, the quality of the raw material used and the manner in which the oils were obtained.

No Browning of Cut Fruit

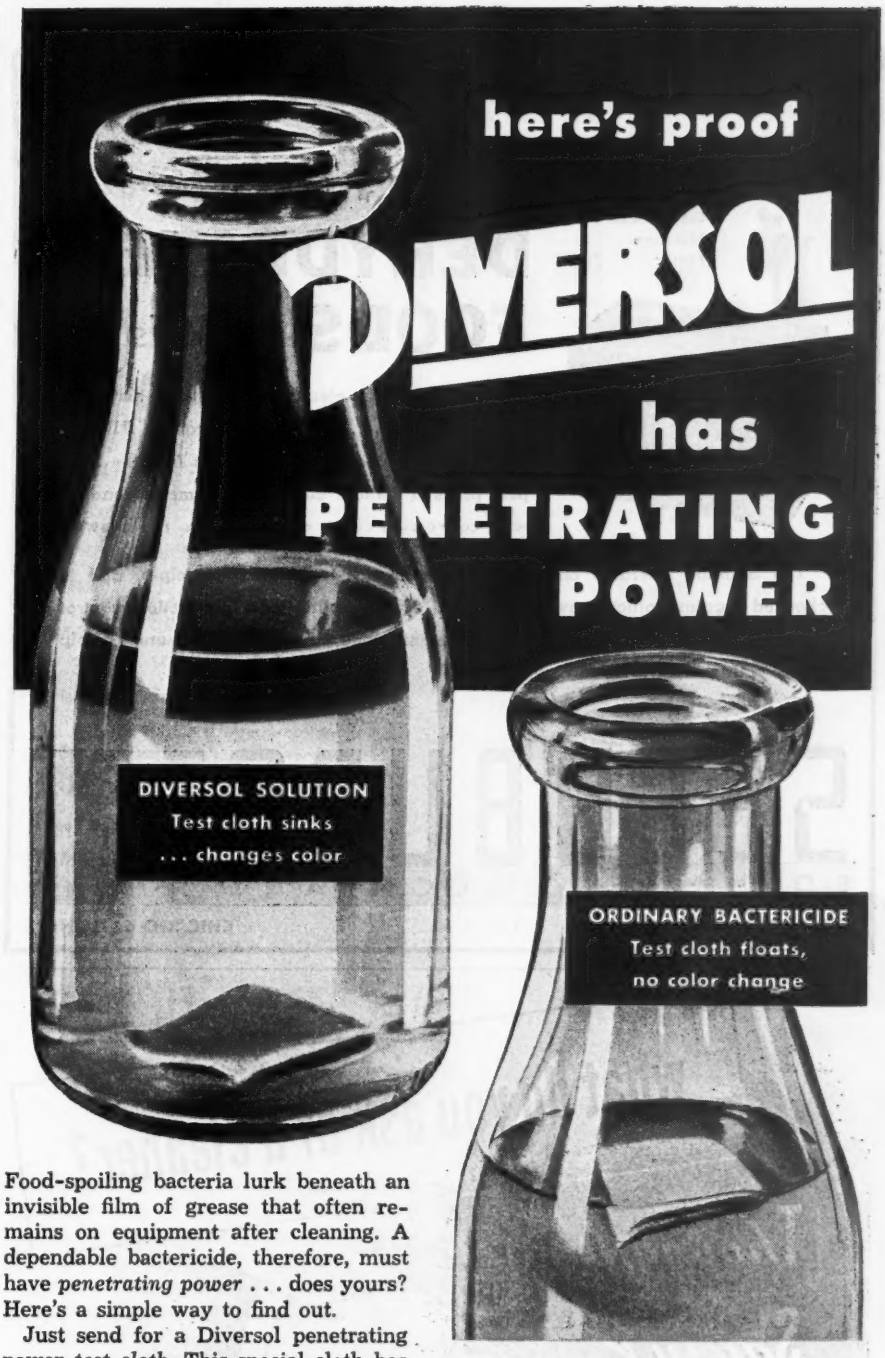
(*Continued from page 75*)

during freezing and cold storage. On thawing, frozen peaches, apricots, plums, pears and apples brown quickly and soon become of little value. Because of their tendency to darken excessively, many varieties of peaches, including nearly all the white fleshed varieties, do not make desirable frozen products.

The ascorbic acid treatment may be applied to unprocessed cut fruit, to the fruit during preparation for freezing or to the sirup or other solution used on frozen fruit. Treated fresh fruit may be kept for several hours with little darkening. The frozen product may be stored at suitable temperatures for periods of a year or longer, without darkening, and after being thawed it will keep its color and flavor for several hours.

L-ascorbic acid has been found to be superior to its isomers, but, nevertheless, d-isoascorbic acid and d-glucoascorbic acid materially retard discoloration and oxidation.

Previously used treatments have included holding the fruit under a 2 percent citric acid solution, covering with a heavy sugar sirup (for example, 65 percent sugar, 35 percent water), and the use of sulphur dioxide and sulphites. The citric acid is not particularly effective. With the heavy sugar sirup, the fruit must be stored at a very low temperature in airtight containers or it darkens in a few months, and in some instances the sirup makes the product unpleasantly sweet. SO_2 and sulphites, unless used in very small amounts, give an undesirable flavor to the fruit. They may also destroy all, or nearly all, of the vitamin B_1



Food-spoiling bacteria lurk beneath an invisible film of grease that often remains on equipment after cleaning. A dependable bactericide, therefore, must have *penetrating power* . . . does yours? Here's a simple way to find out.

Just send for a Diversol penetrating power *test cloth*. This special cloth has been impregnated with a dye and then coated with an invisible film of fatty matter. The dye changes color only when available chlorine penetrates the fatty film.

When a piece of this cloth is placed in a Diversol solution, it quickly sinks and changes color . . . proof that Diversol has penetrated the fatty coating and made contact with the dye. In a bactericide that is lacking in penetrating power, the cloth simply floats on top of the solution and remains unchanged in color.

Diversol not only has unusual penetrating power, but is quick-acting and non-corrosive. Comes in stable crystals that *seal-in* the available chlorine until dissolved in water. With Diversol it is a simple matter to prepare solutions of a definite, germicidal strength. Just add to the water . . . then rinse or spray the previously cleaned equipment. The Diversey Corporation, 53 West Jackson Blvd., Chicago 4, Ill.

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The STEINLITE electronic moisture tester is EASY to USE . . . like tuning a radio. All you do is weigh out a sample—pour it into the hopper, press a button, compare the meter reading with conversion chart, and you have the answer.

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Seedburo Quality — formerly Seed Trade Reporting Bureau — Founded 1912

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Food plants need all these features and they get them in Metso, double-action cleaner. It is Metso's quick-wetting and emulsifying powers that break up grease films. The removed grease is suspended and further prevented from re-depositing on the clean surface. Free-rinsing Metso leaves the surface chemically clean as well as bright.

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Sodium Metasilicate U. S. Pat. 1898707

Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6.

content, and many pure food authorities frown on their use.

In contrast to this, the use of l-ascorbic acid and its isomers on cut fruit does not change the flavor of the fruit noticeably. Obviously, it increases the nutritive value, and consequently, fruit treated with vitamin C should be readily accepted by the public.

Fruits Frozen in Sirup

The concentration of the ascorbic acid, or its isomers, in the sirup used on cut fruit should vary with the nature of the fruit. For example, not all different varieties of one fruit, nor the various kinds of fruits, darken with equal rapidity and intensity. Apples and cherries require a heavier concentration of ascorbic acid than do peaches.

Peaches, peeled by steaming or by treatment with hot lye solution, were washed in water, then placed in a 2 percent citric acid solution to prevent browning prior to slicing and to neutralize any alkali which remained on the surface. The peeled peaches were cut into ½-in. slices and packed in paperboard cartons. To each carton, containing 400 grams of peaches, 100 grams of 60 percent cane sugar sirup with 0.2 gram of l-ascorbic acid was added. The packaged peaches were then frozen and held in storage for 15 months at zero to —10 deg. F. Upon examination, it was found that the treated peaches were not discolored and still were of good flavor and color, even after thawing and exposure to the air for many hours.

Lower concentrations of ascorbic acid in sugar sirup were found to aid materially in retarding discoloration of the frozen sliced peaches but were not entirely effective in retarding browning and the development of oxidized flavor after thawing.

If the process is used on large tins (30 or 50 lb.), almost the entire amount of ascorbic acid should be thoroughly mixed with the top layer of fruit, to a depth of 2 in.

Halved apricots, frozen in sirup containing l-ascorbic acid, do not darken during cold storage. The treated product may be thawed without marked darkening.

Apples were peeled, sliced in eighths and treated as described for peaches. After storage for several months, the apples were thawed and examined. Although after several hours' exposure at room temperature a slight discoloration had developed, these apples had a much

better appearance and flavor than frozen apples which had not been treated.

Napoleon cherries were washed, pitted and packed into cartons, using 150 grams of 50 percent sugar sirup containing 0.3 grams of ascorbic acid on each 325 grams of cherries. They were then frozen by placing the packages before a fan in a room maintained at 0 deg. F. When thawed, these cherries did not discolor nearly as quickly as similar cherries which had not been so treated.

Peaches and apples were also packed in a sirup containing 0.2 percent d-isoascorbic acid or 0.2 percent d-glucoascorbic acid. These products, after freezing and subsequent thawing, did not discolor nearly as readily as did the untreated frozen fruits. However, these treatments were not as effective as was the use of l-ascorbic acid in sirup.

Other Methods

As an alternative procedure, fruit can be sprayed with or immersed in suitable solutions, then packed without sirup. These solutions may be prepared by dissolving the oxidation-retarding material in water, citric acid or sugar solutions, or in the juice of fruits or vegetables.

Sliced peaches were soaked for 30 minutes in an aqueous solution containing 1 part ascorbic acid, d-isoascorbic acid or d-glucoascorbic acid, in 125 parts of water. The slices were packed without sirup in cartons, frozen and stored at 0 deg. F. for several months. After thawing, no serious discoloration was noted for several hours. Then only slight discoloration occurred. This procedure may be applicable in the preparation of sliced fresh fruits for use in the bakery trade.

Dry Powder on Fruit

Ascorbic acid, or the alternatives mentioned, may be applied in powder form directly to the fruit. This treatment is also effective in retarding discoloration and the development of off-flavors caused by oxidation.

This method of application could be used either in the case of fruit to be sold sliced to bakers or on fruit to be frozen. The dry oxidation retardent can be mixed with sugar or some other dry substance if desired.

Reference

1. C. R. Fellers, W. B. Esselen, Jr., W. H. Fitzpatrick, E. L. Moore and J. J. Powers, "Glass Container Research," Massachusetts Agricultural Experiment Station Bulletin No. 388, 1942.

DOLLAR EFFICIENCY—work done per dollar spent—measures the value of steam generation

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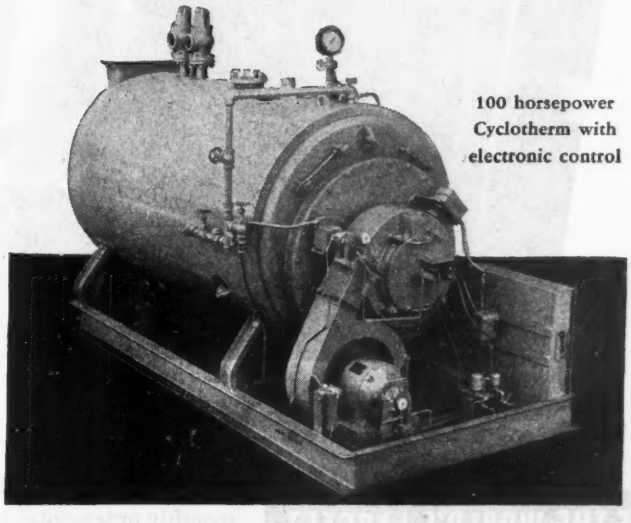

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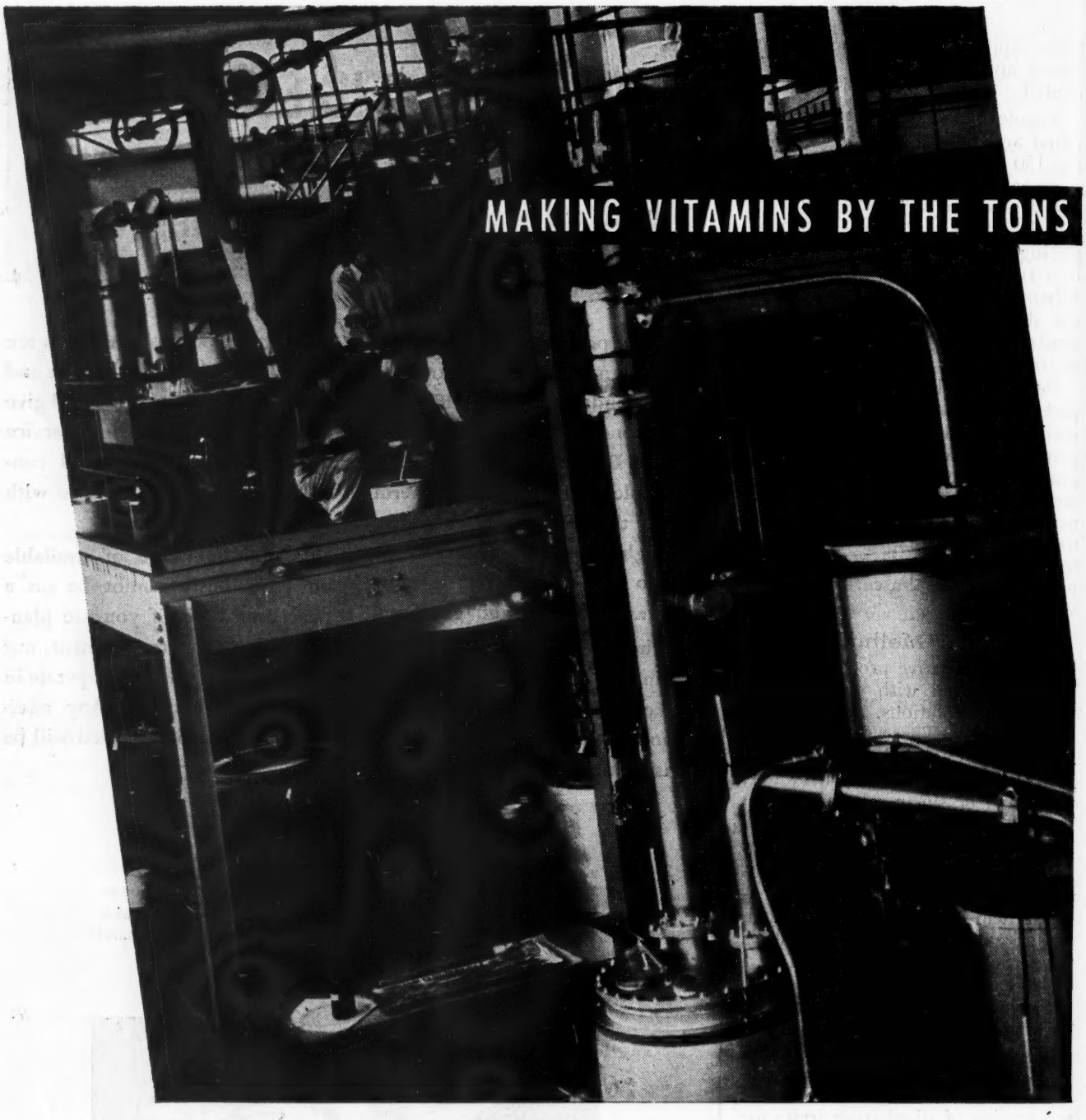

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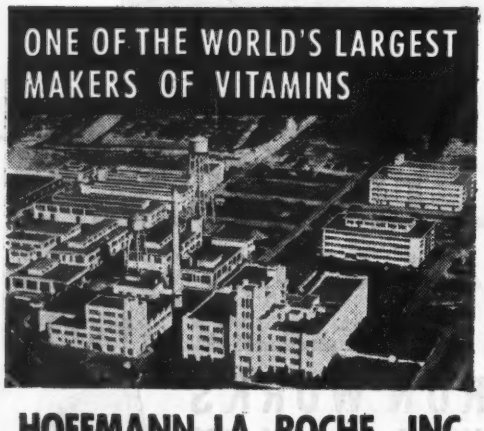

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FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

SUGAR

Massecuite Washing

IMPROVEMENT in the operation of washing massecuites is described in a recent patent. In the usual system, where wash water is added after as much of the mother liquor has been removed as possible, accumulations of sirup and exceedingly fine grains in the outer zones of the sugar wall next to the basket screens clog the filtration spaces. Excessive wash water is required because of this.

By a rearrangement of the washing schedule, so that the wash liquor is mixed with the crystals during the acceleration period, the total quantity of wash liquid required is greatly reduced, with a corresponding reduction in the amount of sugar loss. The efficiency of wash sirup separations is increased and the time required for a centrifugal cycle may be materially reduced.

The wash fluids are added warm, to avoid chilling the crystals during centrifuging. The acceleration time of the centrifugal may be extended, with consequent reduction of power fluctuations and power consumption, as well as reduction of the wear on the centrifugal equipment.

Digest from U. S. Patent 2,347,157, issued April 18, 1944, to E. Roberts and G. E. Stevens, and assigned to The Western States Machine Co., Hamilton, Ohio.

ENZYMES

Flour Improvers

STUDIES have been undertaken to determine the mode of action of flour improvers of the bromate and ascorbic acid types, as well as glutathione. The work is not complete, but the following observations are published in the hope that further research will be stimulated.

Papain inhibition was determined by allowing a standard papain solution to act on gelatine in the presence of the material under test, and determining the ability of the gelatine to set when subsequently placed in the refrigerator.

Compounds containing an enediol group, .C(OH) :C(OH)., alone do not inhibit papain. Whether aliphatic or cyclic, those which have an enediol group with an adjacent carbonyl, .C(OH) :C (OH) CO., do inhibit papain. Substitution in the group destroys the effectiveness as a papain inhibitor. For example, disodium tetrahydroxyquinone is inactive, while tetrahydroxyquinone is very active.

Those compounds which inhibited papain also acted as chemical flour improvers of the bromate and ascorbic acid type. (Not all of these compounds, of course, are permissible or desirable in bread.)

Digest from "Correlation Between Chemical Structure of Some Organic Compounds and Their Action as Flour Improvers and as Inhibitors of Proteolytic Enzymes," by E. Elion, Cereal Chemistry, vol. 21, 314-19, July, 1944.

CEREAL PRODUCTS

Grain in Storage

SYSTEMATIC WORK on the condition of grains in bulk storage, undertaken by the Department of Scientific and Industrial Research, has resulted in the development of new test methods. These studies are on grain in "floor" storage as used generally in England, not in silos. The test equipment devised can be used even under blackout conditions.

It is believed that information needed in any study of the behavior of grain in storage includes temperature, humidity and carbon dioxide concentration at many points throughout the mass, as well as water content and insect infestation determinations on grain samples from corresponding locations.

All of the instruments for sampling are built as "spears," or long rods which can be thrust into the grain, and with wood for the supporting part because its thermal properties approximate those of the grain. It was found expedient to use several thermocouples on each spear, with junctions at spaced intervals, in order to get a large number of readings within a reasonable period of time. It requires at least 30 minutes for the thermocouple to come into equilibrium with the grain because of the poor thermal conductivity of the bulk grain.

A satisfactory instrument has not yet been devised to measure relative humidity at points within the bulk of the grain. It is necessary so far to rely on humidity equilibrium calculations based on the moisture content of grain samples. These are not entirely satisfactory because the relative humidity of air in equilibrium differs with different varieties of grain.

Carbon dioxide diffusion through a column of wheat, approximating the condition in storage, was found to be about one-third that for air.

Thermal conductivity was measured in a device designed to simulate the condition when spontaneous heating starts from small "pockets" within the bulk grain. The sample is held between concentric spheres and heat is supplied from the center. The outer sphere, 30 cm. in diameter, is made of copper, with a covered filling hole at the top. The inner sphere, containing a small heating element and a thermometer, is of aluminum, 10 cm. in diameter, and is held in place by ebonite rods. The entire apparatus is placed in an air chamber thermostatically regulated to within plus or minus 0.1 deg. C. Several days are allowed after filling for the whole to come to equilibrium. Then heat is supplied to the inner sphere at a constant rate until a constant temperature is reached, when the rate of heat input is just equal to the loss. This value is determined for a series of rates of heat input. A constant is calculated for conductivity within the range of temperature investigated.

The apparent conduction is made up of many factors, among which are conduction through the grains, conduction from grain to grain at the point of contact, micro-convection currents involving air flow between grains, transfer of water vapor by diffusion and convection, true convection through intergranular air, and radiation. The conductivity in c.g.s. units for various grains is reported as: wheat (range for several varieties) 0.00036 to 0.00041, maize 0.00042, oats 0.00031. The U. S. Bureau of Standards, using a different method, reported a somewhat lower value for wheat (Department of Agriculture Circular No. 544).

Digest from "The Properties of Grain in Bulk. I. Instruments for Making Measurements in Grain Stored in Bulk," by T. A. Oxley and F. Y. Henderson; "II. The Coefficient of Diffusion of Carbon Dioxide Through Wheat," by Henderson and Oxley; and "III. The Thermal Conductivity of Wheat, Maize, and Oats," by Oxley, Journal of the Society of Chemical Industry, vol. 63, 48-55, Feb., 1944 (Published in England).

DAIRY PRODUCTS

Domestic Cheeses

BRIGHT RED "blue" cheese has been a common, but unwelcome, development in certain curing rooms, since the increase in production of this type of cheese throughout the Middle West.

The causative organism is a fungus known for many years in cheese. It has been named and renamed with great frequency since it was first described in 1826. The present authors return to the 1826 classification and call the mold Sporendonema casei.

In curing rooms in which the red mold has never been conspicuous, it appears to be controlled by adequate cleaning of the cheese surfaces through washing or scraping. Where it has become well established, it is difficult to control. Coating affected cheeses with petrolatum to which calcium propionate and propionic acid had been added tended to limit the surface growth. Further experiments with inhibiting coatings are

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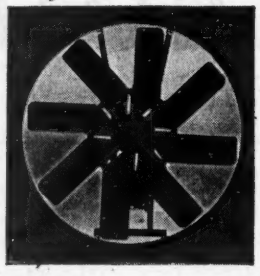

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desirable, particularly to develop a coating which is firmer than the petrolatum at curing room temperatures.

Digest from "Red Mold on Blue Cheese," by B. W. Hammer and J. C. Gilman, Journal of Dairy Science, vol. 27, 413-18, June, 1944.

BYPRODUCTS

Lactic Acid

WHEY is being used as a raw material for lactic acid manufacture in Australia. Cheese whey containing 1 per cent lactic acid and 4 per cent milk sugar, together with soluble proteins and minerals, is sterilized, then inoculated at 109.4 deg. F. with *Bacillus bulgaricus*. Acid is neutralized as formed, since high acidity inhibits fermentation. The fermentation requires about three days.

Lactalbumin is precipitated by boiling and removed in a filter press. The filtrate, made slightly alkaline with lime, is filtered hot into crystallizers. Calcium lactate crystals are recovered by centrifuging, purified by recrystallization from water, and the lactic acid is obtained by precipitating the calcium as sulphate from a dilute water solution. The lactic acid solution is evaporated to 50 percent acid, in which form it is satisfactory for beverage sirup manufacture. Higher concentrations are not yet produced, but production methods are being studied.

Digest from "Lactic Acid Manufacture," by the Research Laboratory of Alfred Lawrence and Co., Ltd., Australian Food Manufacture, vol. 13, 2, June 5, 1944.

QUALITY CONTROL

Freshness in Shell Eggs

ANOTHER unsatisfactory test in quality control has been the candling of eggs. It is now reported that the radio-frequency conductivity of the egg in its shell changes in a regular manner, following an exponential curve akin to that of many chemical reactions. The use of radio-frequency conductivity measurements in grading marketable eggs may offer an accurate method of evaluating quality, irrespective of the age or condition of storage.

Digest from "Influence of Temperature on Changes in Storage Eggs as Measured by Radio-frequency Conductivity," by A. L. Romanoff and G. O. Hall, Food Research, vol. 9, 218-20, May-June, 1944.

Peroxidase Activity

USE of peroxidase to indicate the susceptibility of dehydrated foods to enzymatic spoilage is probably justified. This enzyme resists processing conditions which destroy catalase and oxidases. Also it occurs in nearly all plant cells, whereas in many plant tissues some of the other enzymes may be absent. However, the accurate tests for peroxidase heretofore have been time-consuming and inconvenient for control purposes during processing.

A quick and accurate titration method for determining peroxidase activity has

now been developed. It is based on the reduction of a dye, sodium 2,6-dichlorobenzenoneindophenol, to the leuco form with excess of d-isoascorbic acid in the presence of a buffer salt.

The authors describe the test procedure, including reagents and manipulative details.

Digest from "A Simple, Rapid Quantitative Method of Assaying Peroxidase Activity in Dehydrated Vegetables and Fruits," by E. H. Lucas and D. L. Bailey, Michigan Agricultural Experiment Station Quarterly Bulletin, vol. 26, No. 4, May, 1944.

FISH

Reducing Corrosiveness Of Germicidal Sprays

FORMALDEHYDE in dilute water solution is a cheap and effective germicide for wooden surfaces used in handling fish, but is corrosive to the iron surfaces. The addition of sodium nitrite eliminates the corrosive effect without reducing the germicidal power. A solution strength of 9 parts per thousand of formaldehyde, plus not more than ½ part per thousand of sodium nitrite is recommended.

Sodium nitrite also reduces the corrosiveness of sodium hypochlorite solution, but destroys its germicidal power.

Cleanliness of the surfaces, such as holds and decks of fishing boats, helps reduce spoilage in the fish. Adherent protein and fatty materials must be thoroughly washed off before application of the germicidal spray.

Digest from "Germicidal Sprays and Prevention of Corrosion," by H. L. A. Tarr, Progress Reports of the Pacific Coast Stations, Fisheries Research Board of Canada, No. 59, 7-9, June, 1944.

FATS AND OILS

Oxygen-free Fat Storage Prevents Vitamin A Loss

SIMULTANEOUS oxidative loss of vitamin A and carotene in butter fat stored in air but protected from light had been observed in samples stored at 104, 122 and 140 deg. F. The tests now reported were designed to show the effect of oxygen penetration during storage.

Samples of milk fat were held at 6.8 deg. F. until solidified, then stored at 41 and at 68 deg. F. Comparison samples were placed at the same storage temperatures while still liquid. All were stored 7 months in the dark. The precooled samples remained firm, with a fine homogeneous structure, retaining 21.1 I.U. of vitamin A and 4.3 micrograms of carotene per gram at 41 deg.; 18.4 I.U. and 4.2 micrograms at 68 deg. F. Those placed in storage in the liquid state were coarse, spongy, semisolid, with only 13.6 I.U. vitamin A and 3.5 micrograms of carotene after 41 deg. F. storage. These values fell to 11.0 I.U. and 3.8 micrograms, respectively, after storage at 68 deg. F.

Further tests with samples sealed in

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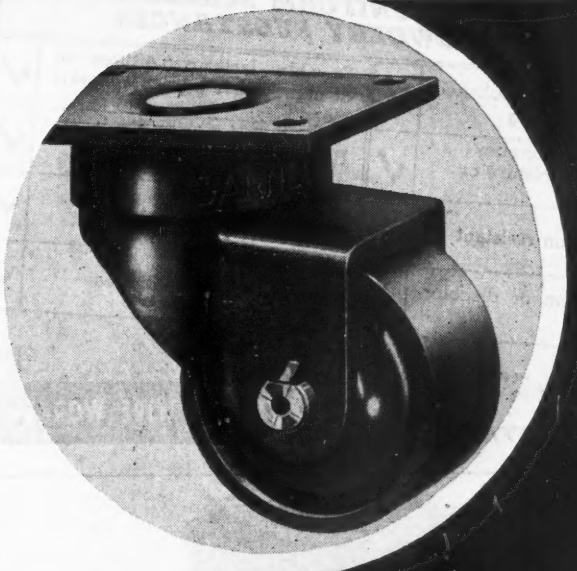

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tin demonstrated that in the absence of free surface oxygen the carotene and vitamin A losses are negligible.

Digest from "Further Studies on Oxidation of Vitamin A and Carotene in Milk Fat," by V. N. Krukovsky, G. H. Ellis and B. W. Barnes, Journal of Dairy Science, vol. 27, 249-55, April, 1944.

PEST CONTROL

Fumigated Flour

BAKING tests on doughs made immediately after fumigation of the flour with hydrogen cyanide, and with the fumigated flour aired for periods up to 72 hours, are reported. These show that the small amount of residual HCN is sufficient to affect adversely the loaf volume. The loss of quality also shows in mixograms, in a reduced mixing time and a tendency to slackness.

Airing of the fumigated flour for 72 hours is sufficient to return it to its original condition.

Gingerbread mix immediately after fumigation showed 160 p.p.m. of residual cyanide. Cake baked with this mix gave a negative test for cyanide, and the cake was eaten without any ill effects. The gingerbread mix also showed that standing 72 hours was sufficient to eliminate the residual fumigant.

Digest from "Effect of Hydrocyanic Acid on the Baking Quality of Flour," by H. D. Young and E. G. Bayfield, Cereal Chemistry, vol. 21, 149-54, March, 1944.

VITAMINS

Ascorbic Acid Retained In Fortified Sweets

SUGAR-COATED chewing gum, hard candy, orange concentrate tablets and jams, all prepared under commercial conditions but with added ascorbic acid, were subjected to controlled storage conditions to determine the retention of the added vitamin. Ascorbic acid tablets were also tested.

The jams were included at the request of the Standing Committee on Nutrition (Canadian Army). These retained 75 percent of the added ascorbic acid after 6 months at 75 deg. F. At higher storage temperatures, 100 and 110 deg. F., the loss was much greater, a 25 percent loss occurring during the first month.

The data reported on the other materials are somewhat difficult to interpret, curves being given for the effect of temperature averaged for all humidity levels (20, 50, 75 and 95 percent) and for the effect of humidity averaged for all temperatures (60, 75 and 100 deg. F.). Indications are that under moisture and temperature conditions which do not cause physical disintegration of the carrier, there is a relatively satisfactory retention of the added vitamin.

Digest from "Effects of Conditions of Storage on the Stability of the Ascorbic Acid in Various Carriers," by J. B. Marshall, J. W. Hopkins and G. A. Young, Canadian Journal of Research, vol. 22, 39-47, May, 1944.

FORMULAS FOR FOODS

FORMULA NO. 485

Tangerine Water Ice

Granulated sugar	8 lb.
Corn sirup solids	4 lb.
Water (14 qt.) about	28 lb.
Tangerine puree*	10 lb.
Gelatine	1½ oz.
Pectin	1½ oz.
Oat flour stabilizer	2 oz.
Tangerine-peel extract	2 oz.
Tangerine certified color	3 oz.
50 percent solution of citric acid or its equivalent	6 oz.

*Unsweetened cold pack.

Directions

Combine the sugar, corn sirup solids, gelatine, pectin and stabilizer by mixing them thoroughly until dry. Heat the water to 180 deg. F. Sift the dry mixture into the hot water and stir vigorously until completely dissolved. Cool this mix to about 50 deg. F.

Add the tangerine puree, flavor, color and acid. Place in freezer. Start whipping and freezing until an overrun of about 40 percent is obtained. Remove from freezer into containers and place in hardening room at about 15 deg. below zero.

In case a milk sherbet is desired, replace some of the water, about 1-qt. with an equal volume of ice cream mix or condensed milk. This is best accomplished at the freezer before adding the acid, in order to prevent curdling.

Formula from B. I. Masurovsky.

FORMULA NO. 486

Apple Breakfast Cake

Whole eggs	10 oz.
Enzyme-converted corn sirup	3 lb.
Hydrogenated shortening	1 lb. 5½ oz.
Brown sugar (No. 10)	2 lb. 8 oz.
Full-fat soya flour	1 lb.
Mixed spices	¼ lb.
Water (variable)	2 lb. 4 oz.
Soda	2¼ oz.
Cake flour, high grade	5 lb. 4 oz.
Baking powder (variable)	1½ oz.
Chopped apples	6 lb.
Salt (variable)	1½ oz.

Directions

Cream together for 5 minutes on medium speed the eggs, corn sirup, shortening, brown sugar, soya flour and spices. Dissolve the soda in the water, add and stir in. Blend well together, by sifting, the cake flour and baking powder; add and mix smooth. Add the chopped apples and salt and mix in well.

Scrape down the bowl properly to insure a smooth batter. The temperature of the finished batter should be 70 to 75 deg. F.

Deposit in deep layer tins. Sprinkle top with buttered pecans and cinnamon sugar. Bake at about 365 deg. F.

This is a "suggested" formula and should be tested thoroughly under the proposed conditions of manufacture.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 487

Gravy Browning

Sago starch	69 to 70 lb.
Salt	25 lb.
Caramel powder	4 to 5 lb.

Directions

Mix the dry ingredients thoroughly, in any convenient manner.

Formula from H. B. Cronshaw, Surrey, England.

FORMULA NO. 488

Peach Fluff Icing

Granulated sugar	4 lb. 8 oz.
Clear sirup	7 lb.
Water	2 lb.
Egg whites	3 lb.
Cream of tartar	½ oz.
Salt	1 oz.
Peach base	6 lb. 8 oz.

Directions

Boil together the granulated sugar, sirup and water to 238 deg. F. Beat the egg whites, cream of tartar and salt to a wet peak and add slowly to the boiled sirup. Add the peach base slowly. Beat to a dry peak.

Peach Base

Peaches, canned or fresh	6 lb.
Clear sirup	3 lb.
Water or peach juice	1 lb.
Lemon juice	¼ oz.
Cornstarch	3 oz.
Egg color	⅛ oz.

Bring the fruit and clear sirup to a boil, add the other ingredients and cook until clear.

Formula from William Gordon, Awrey Bakeries, through American Society of Bakery Engineers.

FORMULA NO. 489

Strawberry Sauce

	Percent
Strawberry puree, cold pack 3:1	60
Granulated cane sugar	20
Gelatine, 225 bloom	0.5
Oat flour stabilizer	0.5
Water	19

Directions

Place the strawberry puree in a steam jacketed kettle. Add the sugar mixed with the stabilizer. Soak the gelatine in the water for about 20 minutes.

Dissolve the sugar in the strawberry puree by heating to the boiling point. Add the wetted gelatine and mix thoroughly into the sweetened puree until the gelatine is completely dissolved.

Cool and place in glass or glass lined containers.

This strawberry sauce could be served also in whipped form by placing it in a mixer equipped with a whipping device.

Formula from B. I. Masurovsky.

FORMULA NO. 490

Buttermilk Spice Layer

Brown sugar	6 lb. 4 oz.
Shortening	1 lb. 12 oz.
Soda	2 oz.
Salt	2 oz.
Spice mix	4 oz.
Whole eggs	2 lb. 4 oz.
Buttermilk	4 lb.
Cake flour	4 lb. 12 oz.

Directions

Cream the sugar, shortening, soda, salt and spice mix together until light. Add the eggs gradually, creaming after each addition. Then add the buttermilk and last the flour. Mix until smooth. Bake at 350 to 375 deg. F.

The spice mix recommended is:

Cinnamon	1 lb.
Allspice	8 oz.
Mace	8 oz.
Nutmeg	4 oz.
Cloves	4 oz.
Ginger	4 oz.
Cake flour	12 oz.

This can be mixed thoroughly and stored in an air-tight container.

Put the layers together with a simple cream filling, and cover with caramel boiled icing.

Formula from Pillsbury Flour Mills Co.

FORMULA NO. 491

Bridge Wafers

Granulated sugar	18 lb.
Light brown sugar	14 lb.
Shortening	18 lb. 12 oz.
Peanut butter	18 lb. 12 oz.
Soda	10½ oz.
Salt	9 oz.
Milk powder	1 lb. 8 oz.
Whole eggs	4 lb.
Bicarbonate of ammonia	1½ oz.
Water	10 lb. 8 oz.
Bread flour	28 lb. 8 oz.

Directions

Run on wire-cut cookie machine. Use 4-hole die. Scale 6½ oz. to the dozen, or about 280 dozen.

Cream up the sugars, shortening and peanut butter. Add the eggs, about one-third at a time. Dissolve the soda, ammonia and salt in the water, then add this solution to the mix and stir in. Add the flour and fold in.

Bake at about 380 deg. F.

Formula from P. C. T. Ewert, Excelsior Baking Co., through American Society of Bakery Engineers.

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